Supplement to

THE JOURNAL OF ENGINEERING EDUCATION

Entered as second-class matter at the Post Office at Lancaster, Pa., under the Act of March 3, 1870.

Published by THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

NEW SERIES
VOL. XXI., NO. 7 MARCH, 1931

REPORT

OF

1930 SURVEY OF ENGINEERING EDUCATION

THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

PRINCE AND LEMON STS., LANCASTER, PA.

AND

PITTSBURGH, PA.

REPORT OF 1930 SURVEY OF ENGINEERING EDUCATION *

F. L. BISHOP, *Secretary*

Society for the Promotion of Engineering Education

The object of this survey was to secure a measure of the progress which had been made in engineering education in each institution. The data were compiled from answers to questionnaires sent out by the Office of Education, Department of Interior, Washington, D. C., January, 1930. Questionnaires were sent to those institutions which had taken part in the investigation conducted by the Society for the Promotion of Engineering Education through its Board of Investigation and Coördination.

QUESTIONNAIRE SENT JANUARY, 1930

DATA IN CONNECTION WITH STUDIES OF ENGINEERING EDUCATION, JANUARY, 1930

The following request for information is being sent to institutions which took part in the investigation conducted by the Society through its Board of Investigation and Coördination. The object of this is to secure a measure of the progress which is being made in engineering education in each institution.—Editor.

INFORMATION FOR THE SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION

Institution_____

Institutional Representative_____

NOTE:—Blank pages will permit amplification of answers if space provided is insufficient.

* We acknowledge with appreciation the valuable coöperation of Commissioner of Education, Wm. J. Cooper, Dr. Walton C. John, General R. I. Rees, and Mr. Ovid W. Eshbach.

PART I

ADMINISTRATION

1. Undergraduate enrollment in Engineering, Dec. 31, 1929.

	E. E.	M. E.	C. E.	CH. E.	E. M.	I. E.			TOTAL
FRESHMEN									
SOPHOMORE									
JUNIOR									
SENIOR									
SPECIAL STUDENTS									
TOTAL									

NOTE: INCLUDE DAY COURSE ENROLLMENTS ONLY.

									TOTAL
FRESHMEN									
SOPHOMORE									
JUNIOR									
SENIOR									
SPECIAL STUDENTS									
TOTAL									

NOTE: INCLUDE DAY COURSE ENROLLMENTS ONLY.

2. Enrollment of Graduate Students in day courses, Dec. 31, 1929.

	FOR ENGR. DEGREE	FOR M. S.	FOR PH. D.	TOTAL
ENGINEERING				
PHYSICS				
CHEMISTRY				

NOTE: WHERE THE ABOVE FORM IS UNSUITED TABULATE ON SEPARATE SHEET.

3. If evening courses in collegiate engineering subjects are offered give total enrollment, Dec. 31, 1929.
   Number receiving credit toward bachelor degree.....
   Number receiving credit toward graduate degree.....
   Number of students not candidates for degree.....

4. Fees for undergraduate courses. (If different for non-residents of the state, so indicate.)
   (a) Tuition for Engineering Courses.....
   (b) Tuition for Other Courses.....
   (c) Additional charges per year, including laboratory fees, etc., for Engineering Courses.....

5. Cost per Engineering Student per year. (Include only if estimate has been previously made):—
   Remarks as to basis of calculation:.....

6. Administrative Officers and Teachers of Engineering Students.

	NUMBER	SALARY		
		MAXIMUM	AVERAGE	MINIMUM
ADMINISTRATIVE OFFICERS (Incl. Dean)				
DEPARTMENT HEADS				
PROFESSORS				
ASSOCIATE PROFESSORS				
ASSISTANT PROFESSORS				
INSTRUCTORS				
ASSISTANTS				
* OTHERS				

*** NOTE: PLEASE SPECIFY.**

7. Approximate investment in laboratory equipment used for instruction in engineering.
8. General Remarks on Part I.....

PART II

STUDENT SELECTION AND EDUCATIONAL GUIDANCE

1. Contacts with Secondary Schools.
   (a) If systematically maintained please state nature of these contacts.....
   .....
   (b) Have these contacts resulted in improvements in quality and fitness of matriculants, or in other desirable results?.....
2. What is your process of selection of Freshmen?.....
3. Admissions.
   (a) Total number of Freshmen admitted this year, up to Dec. 31, 1929
   .....
   (b) Number admitted with conditions.....
   (c) Number of Students admitted to advanced standing.....
      1. From other Engineering Schools.....
      2. From other Collegiate Schools.....
      3. Transfers from other courses in your institution.....
   (d) Number of Freshmen who have failed to present required units in the following subjects:

	UNITS REQUIRED	NUMBER FAILING TO PRESENT REQUIRED UNITS
ALGEBRA		
SOLID GEOMETRY		
TRIGONOMETRY		
PHYSICS		
CHEMISTRY		

4. Educational Guidance and Orientation of Freshmen.
   (a) If one or more of the following methods are used please indicate by a check mark.
   ....." Freshmen Week "—Number of days.....
   .....Engineering Problems Course.
   .....Required Orientation Lectures.
   .....Series of unrequired talks or lectures.
   .....Faculty advisers.
   (b) Other methods.....

5. Eliminations.

(a) From the original group of Freshmen:—

	CLASS BEGINNING IN FALL OF:		
	1923	1924	1925
NUMBER OF FRESHMEN ADMITTED			
NUMBER REMAINING AFTER 1 YEAR			
NUMBER REMAINING AFTER 2 YEARS			
NUMBER REMAINING AFTER 3 YEARS			
NUMBER GRADUATING IN 4 YEARS			
NUMBER GRADUATING IN 5 YEARS			
NUMBER STILL IN COLLEGE			

(b) Please tabulate below the total enrollment at the beginning of the school years indicated.

FRESHMEN	1923 ———	1924 ———	1925 ———
SOPHOMORES	1924 ———	1925 ———	1926 ———
JUNIORS	1925 ———	1926 ———	1927 ———
SENIORS	1926 ———	1927 ———	1928 ———
NUMBER GRADUATING	1927 ———	1928 ———	1929 ———

6. (a) Do the college records indicate the causes for eliminations.....

(b) If any analysis of causes for eliminations has been made please state result.....

7. General Remarks on Part II.....

PART III

COURSES AND CURRICULA

1. Please state the number of semester hours credit required for graduation.

	E. E.	M. E.	C. E.	CH. E.	E. M.	I. E.		
MATHEMATICS								
PHYSICAL SCIENCE								
ENGLISH								
MODERN FOREIGN LANGUAGES								
ECONOMICS								
TECHNOLOGICAL SUBJECTS,								
MAJOR BRANCH								
OTHER TECHNICAL SUBJECTS								
SHOP								
DRAWING								
ELECTIVES								
PHYSICAL & MILITARY EDUCATION								
TOTAL								

MATHEMATICS								
PHYSICAL SCIENCE								
ENGLISH								
MODERN FOREIGN LANGUAGES								
ECONOMICS								
TECHNOLOGICAL SUBJECTS, MAJOR BRANCH								
OTHER TECHNICAL SUBJECTS								
SHOP								
DRAWING								
ELECTIVES								
PHYSICAL & MILITARY EDUCATION								
TOTAL								

2. What significant changes in educational policy or curricula have taken place in the last five years.

3. What significant changes have taken place in the last five years regarding the number and quality of graduate courses.....

4. Where is the administrative control of graduate work placed and how is it supervised?

5. General Remarks on Part III.....

PART IV

EDUCATIONAL DEVELOPMENT

1. Have any significant changes been made in teaching methods, and if so give particulars.....

2. Have any experiments in teaching methods been conducted? If so, give particulars.....

3. Normal teaching load of Engineering Teachers expressed in total clock hours (class periods of fifty to fifty-five minutes each) per week in actual contact with students in class or laboratory.

	Hours per Week
Department Heads	
Professors	
Associate Professors	
Assistant Professors	
Instructors	
Others	

4. Research and Publications.
   (a) Number of Research Fellowships.....
   (b) Number of part and full time assistants devoting time to research.....
   (c) Number of published bulletins or monographs on research exclusive of articles in periodicals, except where reprinted. (Within the last five years).....
   (d) Total expenditures for research, 1928–1929 (if available).....

5. S.P.E.E. Summer Schools.
   (a) Has your institution defrayed any of the expenses of the representative to these schools?
   (b) What is your impression as to the values received by those who have attended?.....

6. General Remarks on Part IV.....

PART V

GRADUATE PLACEMENT AND DEMAND

1. Methods employed in placement of seniors.
   (a) If one or more of the following methods are used, please check.
   .....Personnel or Placement Officer.
   .....Dean of Men or similar Administrative Officer.
   .....Department Heads.
   (b) Give brief statement the type of records kept for placements purposes
   .....

2. How is information of employment opportunities conveyed to seniors and undergraduates?

3. Opportunities for Engineering Graduates.
   Please give what information you have under the following:—
   (a) Number of Senior Engineering Students, 1929 .....
   (b) Number of Industries visiting campus, 1929 .....
   (c) Number of contacts through correspondence or other means .....
   (d) Number of positions offered. .....

4. From what information is available, please list below the number of positions accepted at the different initial starting salaries.

MONTHLY RATE	NUMBER OF POSITIONS

5. If any studies of salary progress of graduates have been made in the last five years, list them. Please include the results of the studies.

6. General Remarks on Part V.....

REPORT OF 1930 SURVEY OF ENGINEERING EDUCATION

Part 1. Enrollments and Factors Affecting Enrollment
- *a.* Eliminations in College
- *b.* Selection Methods
- *c.* Orientation Methods
- *d.* Secondary School Contacts
- *e.* Tuition

Part 2. Standards of Education
- *a.* Entrance Requirements
- *b.* Curricula Requirements

c. Improvement in Methods
d. Graduate Study
e. Research
f. S. P. E. E. Summer Schools

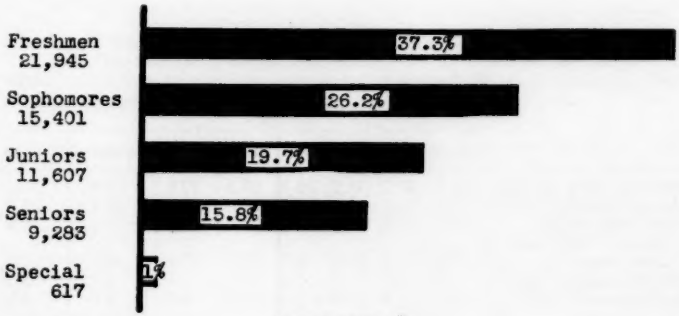
Part 3. Administration
a. Salaries
b. Teaching Load
c. Personnel Systems

ENROLLMENTS AND FACTORS AFFECTING ENROLLMENTS *

1. Total Undergraduate Engineering Enrollment December 31, 1929

(For comparative enrollment see Vol. XVIII, No. 10, Page 951, Journal of Engineering Education)

Distribution by Classes in 119 Institutions ..... 58,853 Students
Probable Enrollment in 145 Institutions 70,000



Admissions *

Data From 83 Institutions

(*a*) Number of Freshmen admitted in 1929	17,840
(*b*) Number of Freshmen admitted with conditions	3,041
(*c*) Students admitted to advanced standing	2,618
1. From other Engineering Schools	601
2. From other collegiate schools	1,714
3. Transfers from other courses	303

* Page 221, Vol. I, Final Report of Investigation of Engineering Education.

2. PERCENTAGE DISTRIBUTION OF CLASS ENROLLMENTS BY ENGINEERING COURSES
December 31, 1929

	Class			
	Senior	Junior	Sophomore	Freshmen
Electrical Engineering	29.8	29.0	26.2	27.9
Mechanical Engineering	19.1	20.5	22.6	22.7
Civil Engineering	25.1	23.9	20.6	19.5
Chemical Engineering and Chemistry	11.0	11.2	13.2	13.1
Mining Engineering	1.3	1.4	1.9	1.7
Industrial, Administrative and Commercial Engineering	4.0	3.6	2.9	1.4
Architectural Engineering	3.4	4.0	4.1	4.4
Aeronautical Engineering	2.0	1.7	3.3	2.9
Metallurgy	.8	1.8	.8	.7
Other	3.5	2.9	4.4	5.7
Total	100.0	100.0	100.0	100.0
Number of Students	6,267	7,852	10,007	10,418
Number of Institutions	75	74	65	43

3. PERCENTAGE DISTRIBUTION OF ENROLLMENT IN SIX MAJOR COURSES

	First Degrees Conferred				Enrollments Dec. 31, 1929			
	1922	1924	1926	1928	Senior	Junior	Sophomore	Freshmen
Electrical Engineering	23.5	28.2	31.2	35.5	33.3	32.2	29.6	31.3
Mechanical Engineering	26.4	28.3	25.2	22.5	21.2	22.6	25.4	25.4
Civil Engineering	25.4	24.0	26.0	26.0	28.0	26.7	23.3	21.9
Chemical Engineering and Chemistry	15.9	11.5	10.3	9.7	12.3	12.5	15.0	14.7
Mining Engineering	7.3	6.9	5.7	3.9	1.4	1.5	2.1	1.8
Architectural Eng'r.	1.5	1.1	1.6	2.4	3.8	4.5	4.6	4.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

4. PROBABLE NUMBER OF FUTURE GRADUATIONS *

Calculation Based on Growth In Fifty-eight Colleges of Engineering

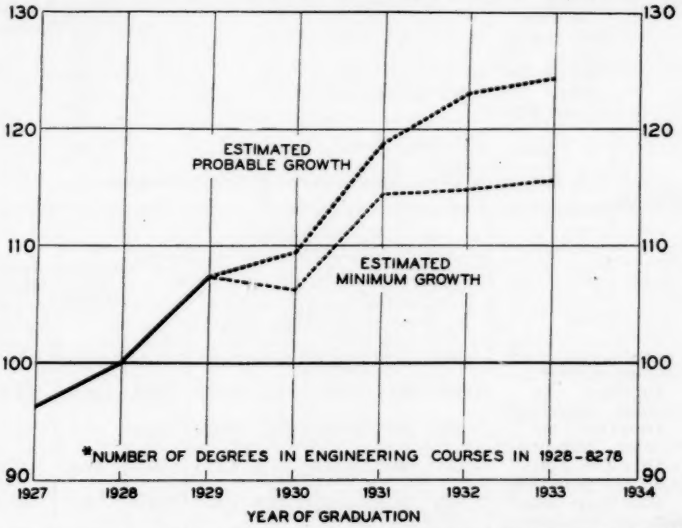
Year of Graduation	First Degrees Per cent of 1928	
	Minimum	Probable
1927	96.4	96.4
1928	100.0	100.0
1929	107.4	107.4
1930	106.3	109.4
1931	114.5	118.8
1932	114.8	123.1
1933	115.6	124.4

Number of degrees in 1928—8,278

* *Ibid.*, page 221.

5. Percentage Increase in Graduations

Calculations Based on Growth in 58 Colleges of Engineering *



6. Enrollment of Graduate Students in Day Courses December 31, 1929 *

	Degree			Tota
	Engrg.	M. S.	Ph. D.	
Engineering	710	837	61	1,608
Physics	6	153	155	314
Chemistry	9	345	311	665
Total	725	1,335	527	2,587

Data from 110 institutions. 71 institutions reported a total enrollment of 2,835 students, 248 of whom were unclassified. 39 institutions reported no graduate courses.

7. Enrollment in Evening Courses in Collegiate Engineering Subjects December 31, 1929 †

Institutions included	111
Number offering Evening Courses	22
Number receiving credit for Bachelor Degree	4,463
Number receiving credit for Graduate Degree	1,760
Number of students not candidates for degree	7,933
Unclassified	1,850
Total Enrollment in Evening Courses	16,006

* *Ibid.*, page 322.

† *Ibid.*, page 324.

8. Tuition for Engineering Courses

Data from 87 Institutions

Tuition Per Year	Number of Institutions
$400 to $450	11
300 to 399	13
200 to 299	16
100 to 199	17
Under $100	30
Total	87

9. Record of Total Eliminations in Three Classes *

	Class Graduating in						Average Per-centage	1926 Report
	1927		1928		1929			
	No.	Per Cent	No.	Per Cent	No.	Per Cent		
Number of Freshmen Admitted	7,696	100.0	8,915	100.0	9,519	100.0	100.0	100.0
Number Remaining After One Year	4,615	60.0	5,623	63.1	6,992	73.4	65.5	60.6
Number Remaining After Two Years	3,418	44.5	4,241	47.6	4,441	46.7	46.3	42.1
Number Remaining After Three Years	2,821	36.7	3,548	39.8	3,810	40.0	38.8	33.8
Number Graduating in Four Years	2,159	28.1	2,392	26.9	2,613	27.5	27.5	28.1
Number Graduating in Five Years	470	6.1	559	6.3	311		6.2	
Number Still in College	82	1.1	191	2.1	763		1.6	
Number of Institutions	47		49		52			25

Record of Eliminations

Of 90 institutions, 42 reported that the college records indicated the cause of eliminations, 20 said the records only partly gave the causes, and 28 reported they did not.

Causes of Elimination †

Of 112 institutions 69 gave no report, 21 stated what they believed the principal causes to be and 22 others gave some detailed analysis of the causes. An analysis of the reasons given by the 21 institutions is as follows:

Reason	Given by
Scholastic Difficulty or poor ability	15
Finances	13
Lack of Preparation	8
Lack of Aptitude and Interest	6
Outside Work	4
Mathematics	3
Ill Health	3

* *Ibid.*, page 200.
† *Ibid.*, page 210.

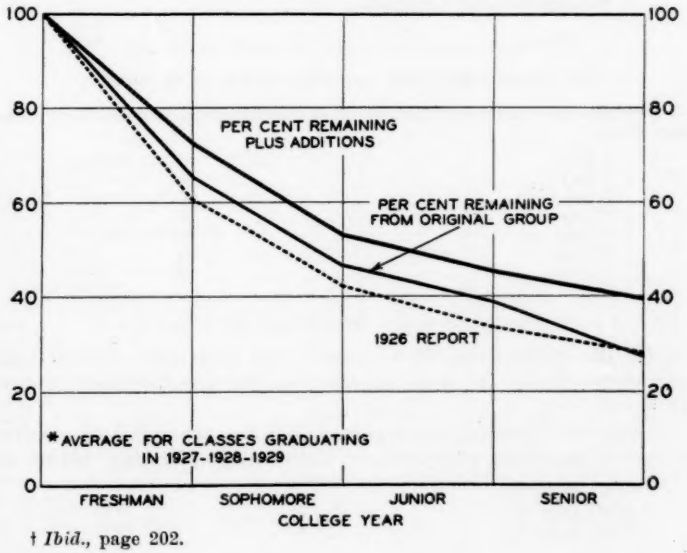
A review of the detailed analysis as given by 22 institutions indicates the principal reasons in order of importance to be as follows: Scholarship, Health, Finances, Personal, Lack of Interest, Preparation, Transfers to other colleges and departments.

10. ENROLLMENT RECORD OF THREE CLASSES, INCLUDING ELIMINATIONS AND ADDITIONS IN SUCCESSIVE YEARS

	Class Graduating in						Average Percentage
	1927		1928		1929		
	No.	Per Cent	No.	Per Cent	No.	Per Cent	
Freshmen	10,233	100.0	11,652	100.0	11,886	100.0	100.0
Sophomores	7,415	72.5	8,350	71.8	8,691	73.1	72.5
Juniors	5,484	53.6	6,092	52.3	6,307	53.0	53.0
Seniors	4,661	45.5	5,233	44.9	5,384	45.3	45.2
Graduating	4,104	40.1	4,533	38.9	4,732	39.8	39.6
No. of Institutions	56		59		60		

Note.—Enrollments taken at the beginning of each school year.

ENROLLMENT RECORD OF 3 CLASSES, † INCLUDING ELIMINATIONS AND ADDITIONS IN SUCCESSIVE YEARS *



† *Ibid.*, page 202.

Selection of Freshmen *

Of the 103 institutions, 84 reported admission on the basis of certificate from high school or college board examination. Five required either examination at the institution or college board examination, 13 limited admission to those in a specified portion of their high school class, 11 required a personal interview, 13 used psychological or aptitude tests in addition to the certificate, 13 mentioned other considerations, such as character testimonials and achievements in extra-curricula affairs, 2 required a medical examination and 5 reported no method of selection.

Educational Guidance and Orientation of Freshmen †

Data from 103 Institutions

Method Used	Number of Institutions Yes	No
Freshmen Week	73	23
Engineering Problems Course	29	67
Required Orientation Lectures	52	44
Series of Unrequired Talks or Lectures	22	74
Faculty Advisors	68	28

Institutions using none	7
Institutions using 1 method	13
Institutions using 2 methods	30
Institutions using 3 methods	37
Institutions using 4 methods	14
Institutions using 5 methods	2
Total	103

Educational Guidance and Orientation of Freshmen

Seventy-three institutions reported the following amounts of time for "Freshmen Week."

1 Day	5 Institutions
2 Days	6 "
3 Days	27 "
4 Days	12 "
5 Days	16 "
1 Week	6 "
9 Days	1 "

Contacts with Secondary Schools ‡

Of 103 institutions, 58 reported some systematic contact with secondary schools, 34 made no effort in this direction and 11 gave no report.

Forty-nine institutions reported that the contacts had resulted either in improved matriculants, better understanding, better co-

* *Ibid.*, page 196.
† *Ibid.*, page 183.
‡ *Ibid.*, page 172.

operation, and improved preparation, and thought it very worth while. Two were doubtful of the benefits and 3 reported no improvements.

It is apparent that many of the institutions have only recently established these contacts but the reports from them indicate considerable confidence in the desirability of continued contact.

STANDARDS OF EDUCATION

Required Units in Particular Subjects

Data from Eighty-six Schools *

Subjects	Number of Institutions					
	0 Unit	½ Unit	1 Unit	1½ Units	2 Units	2½ Units
Algebra	2	0	9	52	22	1
Solid Geometry	15	60	5	3	1	0
Trigonometry	65	18	0	1	0	0
Solid Geometry or Trigonometry	—	2	—	—	—	—
Physics	36	3	30	0	0	0
Chemistry	52	0	17	0	0	0
Physics or Chemistry	—	—	17	—	—	—

Courses and Curricula

Semester Hours Required for Graduation †

(*Average Figures for Six Major Courses*)

Subjects	E. E.	M. E.	C. E.	CH. E.	E. M.	I. E.
Mathematics	18.5	18.1	18.2	17.9	16.5	15.6
Physical Science	20.7	19.3	20.0	25.2	22.2	21.5
English	9.0	8.9	9.1	8.7	7.5	11.2
Modern Foreign Languages	1.2	1.0	1.2	5.3	1.8	1.9
Economics	4.7	5.0	5.3	4.3	4.5	11.9
Technological Subjects, Major Branch	39.0	41.0	50.0	44.9	45.4	34.2
Other Technical Subjects	23.5	22.9	18.4	21.6	31.2	22.4
Shop	4.6	7.2	1.7	1.9	1.2	6.4
Drawing	7.2	7.8	7.1	5.6	6.4	8.2
Electives	10.4	9.3	8.4	6.7	5.9	12.2
Physical & Military Education	4.6	5.0	4.6	4.3	5.1	4.9
Total	143.4	145.5	144.0	146.4	147.7	150.4
Number of Institutions	51	44	51	41	15	17

* *Ibid.*, page 429.
† *Ibid.*, page 430.

Have any significant changes been made in teaching methods?

NUMBER OF INSTITUTIONS REPORTING SIGNIFICANT CHANGES IN TEACHING METHODS AND EXPERIMENTS IN METHODS *

	Significant Changes	Experiments
Yes	30	26
No	34	32
No Report	37	43
TOTAL	101	101

No. 1. No.

No. 2. None, except through reports of the representatives of the teaching staff who attended the summer session of the S. P. E. E.

No. 4. No.

No. 5. ——

No. 7. ——

No. 8. No significant changes in general policy; departmental changes have been made.

No. 10. There have been no outstanding changes in teaching methods; though as a result of faculty discussion and particularly of departmental staff conferences, minor improvements have been adopted from time to time.

No. 11. Courses and methods changing like a cork on water, but the fundamental methods in vogue for 80 years are not deviated from to any extent by any professor.

No. 13. ——

No. 15. Adoption of divisioning according to ability in freshman and sophomore work—considered successful. Course in elementary engineering mathematics to bridge gap between high school and college work. Same reduction of extent of ground covered in certain subjects in order to provide greater thoroughness.

No. 16. No.

No. 17. ——

No. 18. None.

No. 19. ——

No. 23. ——

No. 24. ——

No. 25. Many meetings, discussions and conferences. It is felt that individual thought and interest have been stimulated. There is no desire to force changes or establish standardized procedure.

* Bulletin No. 11, page 522.

No. 26. ——

No. 27. No.

No. 31. Several changes have been made which are worthy of note: The work of the classroom is co-related with that of the shop in the following courses: (*a*) Production engineering (this course would be impossible as conducted without co-operative students); this course is largely based on the case problem method with its material drawn to a great extent from the shop. (*b*) Industrial management; the major divisions of this subject, as presented in "Anderson," are worked over by the student by corresponding case problems, the material for which must be again taken from the co-op plants.

No. 32. No changes of significant value.

No. 33. ——

No. 34. All of our laboratory exercises are conducted as "studies" rather than as "tests." The student is encouraged to increase his confidence in his ability to predict results from a knowledge of his theory and to compare these predicted results with the observations from his laboratory studies.

No. 36. No changes of this character have been made in the last few years.

No. 38. No.

No. 39. None.

No. 42. We have adopted the method of devoting one two-hour period a week to problem and computation work in connection with courses in mechanics, and we may use this method in other courses if it is successful in the mechanics courses.

No. 44. ——

No. 46. ——

No. 48. No.

No. 49. In freshman and sophomore courses in English and mathematics, the sections have been segregated on the basis of ability, the "fast moving" sections covering the ground more thoroughly and more extensively.

No. 50. More problem work—less lectures—more design work.

No. 51. There has been a rather definite trend in most of our departments toward placing a greater responsibility on the individual student; the emphasis has been on *learning* rather than *teaching*. More and more "project" work has been introduced, or the student is en-

couraged to investigate some problem on his own account.

No. 52. ——

No. 54. The policy of close personal supervision over the work of a small group of selected students characterizes the Thayer School.

No. 57. No significant changes.

No. 58. ——

No. 61. ——

No. 62. None.

No. 63. ——

No. 67. ——

No. 68. Previous to 1927, supervised study periods were extensively used, particularly in mechanics. These have been largely discontinued because of the cost of that method.

No. 69. ——

No. 70. Only some minor changes where improvement has been made.

No. 71. None.

No. 72. ——

No. 74. None.

No. 75. No.

No. 77. ——

No. 79. Emphasis is laid upon improving methods of teaching but the improvement is generally left to the teacher. A definite plan for improved teaching is being worked out by the faculty.

No. 81. The most significant change made recently has been in the establishment of a Department of General Engineering in 1924. This department consists of the freshman work which is common to all the branches of engineering. It has an administrative head who gives two thirds of his time to his administrative and advisory work with the students, the latter being an important feature. The orientation and problems courses for freshmen come under his supervision. During the past few years placement tests have been given entering freshmen to be used as a basis for sectioning. Resectioning on the basis of ability is carried out throughout the year with considerable success.

No. 82. None.

No. 83. No.

No. 84. Nothing of any significance.

No. 85. ——

No. 87. There have been no real changes made recently except that more attention has been paid to methods of conducting laboratory work.

No. 89. Juniors and seniors, seniors especially, are expected to, and do, work under less direct leadership of teacher. Placed more on own initiative.

No. 91. No material changes made.

No. 93. We have two honors group courses in electrical engineering. Various minor changes have been made in several courses as a result of the S. P. E. E. investigation. In the departments of chemical engineering and civil engineering the curricula have been altered in accordance with suggestions on the unified plan discussed in S. P. E. E. meetings. (In general we feel that our plan of small classes and individual attention to the student works well.)

No. 94. In addition, constant effort has been made to reduce the numbers, in the section, particularly in freshmen and sophomore mathematics.

No. 95. ——

No. 96. None that are of sufficient importance to report. During the last two years, the Committee on Educational Policy has given some attention to possible improvements in the quality of teaching; so far, however, while there has been considerable interest aroused in the problem the actual quality of teaching has not been greatly changed. The securing of high class men for the faculty and the promotion of a friendly feeling and free discussion among the members is encouraged.

No. 97. ——

No. 98. More emphasis on student work and less on lecture instruction.

No. 99. Weekly chemistry and physics demonstration lectures have been added to the regular recitation and laboratory work. Improved results are being obtained. Physics for all technology students has been placed in the sophomore year. In electrical engineering mathematics is being emphasized more in junior problem work. Architectural students are finding the physics that has been especially designed for them more interesting than the physics usually given engineering students. Graphical methods will be used more in teaching these students mechanics in the future than has been our practice.

No. 100. ——

No. 101. Only minor, except greater attention is being paid to the individual students. Orientation tests serve as placement tests and the results for freshmen are placed in the hands of the instructional staff within three or four days after the opening of the first semester, where they are used for individualization of instruction. Sub-collegiate courses in English and mathematics have been developed for those who have poor preparation.

No. 102. No.

No. 104. No marked changes in method of presenting subject matter.

No. 105. ——

No. 106. ——

No. 107. S. P. E. E. Discussions of methods are studied for application to our conditions.

No. 111. Gradual elimination of the "lecture" courses and the substitution of quiz sections. Reduction of size of sections to about 20 in most subjects. Increased emphasis on problem work and project work. Increase in the amount and great improvement in the character of laboratory courses in such subjects as materials of engineering, electrical and mechanical equipment and design.

No. 112. No.

No. 113. No changes made.

No. 114. ——

No. 115. A more general use of functional situations in which the solution of problems plays an important part. A special effort is made in the assignment of laboratory problems to avoid specific directions in many instances in order to cultivate the research attitude and point of view. A more general use of two-hour problem periods in courses in mathematics and pure and applied mechanics.

No. 117. I do not think so.

No. 118. ——

No. 119. No.

No. 120. While there has been a general improvement in instruction due to course organization and clarified objectives, there has been no unusual change in teaching methods. Supervised design, computation, and laboratory work have been emphasized at the college for a number of years.

No. 121. The exceptional student has been given more opportunity to exert himself, according to his own initiative and ability by being granted special projects under supervision. This is reserved largely for seniors in the School of Engineering. It has succeeded.

No. 123. ——

No. 124. ——

No. 126. Sectioning according to ability in operation in several departments, especially those having large freshmen groups.

No. 127. In the engineering physics courses, in addition to the regular lectures and laboratory work, the students are met in small tutorial sections (12 is the maximum number). The tutorial sessions are 2 hours in length and the work consists of supervised problem solving and quizzes both oral and written. An important point in connection with the written quizzes is that the quiz papers for an entire semester, written on printed form, are kept in a regular card catalogue file.

No. 128. ——

No. 129. ——

No. 130. We have been endeavoring, ever since the change in administration two years ago, to place the student more and more upon his own responsibility, in the last two years of the course.

No. 132. None except that the matter at various times has received faculty discussions.

No. 133. Wherever possible we assign two teachers to a class. This is a dangerous expedient, but if the necessary cooperation can be secured, it produces good results. One man, of course, is in charge of the class, and the other attends as a sort of a visitor and assistant. For example, one of the assistant professors attends the class of the department head in analysis of stresses, and is expected to indicate to the department head his opinion of how well the subject is "getting over." Incidentally, the assistant professor has charge of related work, and the department head attends his class as a sort of visitor-critic. When two professors are around, each will be more careful about what he says and does.

No. 134. No.

No. 135. No.

No. 136. None in our first four years.

No. 137. Our method of teaching has always emphasized the recitation rather than the lecture system. Blackboard demonstration by the pupils with the individual attention of the instructor to each student has characterized the method. In such subjects as chemistry, physics, etc., where illustrative lectures are necessary, recitations on the lectures supplemented by an approved textbook are required.

No. 138. ——

No. 139. ——

No. 140. None.

No. 141. None.

No. 142. ——

No. 143. We are striving very hard to reduce the lectures to a minimum and the participation on the part of the students to a maximum. We are advocating in each class in each course a short written quiz every day in the week and as little emphasis as possible being placed on final examinations. A written quiz each day is in line with current outside engineering practice and I need not go into the details of this. It solves many of the questions which arise concerning matters of attendance et cetera with the lower classmen.

No. 145. No.

What significant changes in educational policy or curricula have taken place in the last five years?

No. 1. When the results of the Survey of Engineering Education were published, the entire educational policy and curriculum were carefully reviewed. Our existing practices were found to be in practically complete accordance with those followed in other engineering schools of repute. A few minor changes were made, to bring about rather better distribution of students' time. No significant changes were found necessary.

No. 2. Change of degree practice—5 year chemical engineering course reduced to 4 year—Requirements for entrance raised—Revised curriculum evening graduate work instituted.

No. 4. Little change, except amount of mathematics required is being reduced. There is a tendency toward lightening schedules, especially in the sophomore year.

No. 5. In April, 1924, our curricula was revised so as to reduce the normal load of the student from 23 semester hours

to 20. In December, 1927, a further revision was made in order to reduce most of our courses to a three-hour basis, in this way simplifying the schedule. The total load on the student was not changed but considerable readjustment was necessary.

No. 7. Complete reorganization of Chemical Engineering Department and chemical engineering curriculum. The introduction of a course on the calculus of probabilities for all seniors. The introduction of "Honors Courses."

No. 8. Five-year course instituted five years ago; coöperative in last four years in three-month alternative periods.

No. 10. There have been no radical changes. From the usual departmental staff conferences minor changes have been made from time to time in subject matter, in methods of presentation, and in proportion of time assigned to preparation, to lecture, to classroom work, and to laboratory work.

There has been development and some extension of coöperative education. The coöperative courses in chemical engineering, it is believed, have been steadily improved, and are of demonstrated worth. A coöperative course has been added recently in railroad engineering. There has been development and extension of the summer camp courses in civil and in mining engineering.

No. 11. ——

No. 13. Standards are being raised steadily on the lines of the S. P. E. E. recommendations.

No. 15. No change found to be advisable. Courses are kept in step with developments.

No. 16. No marked changes have been made. Minor changes in conduct of certain courses. Four years ago mechanics (statics) was taken out of the second semester of the freshman year and moved forward into the sophomore year. A course, introduction to engineering, was substituted in freshman year and other necessary changes made.

No. 17. All of the engineering curricula have been revised to approach the recommendations of the S. P. E. E. Committee on Investigation and Coördination.

No. 18. Beginning 1930–31 the engineering courses will be administered under a School of Engineering, whereas heretofore they have been conducted in the School of Sciences, which included the degrees B.S. (general)

and B.S. (pre-medical). With a view to the inauguration of the new plan, the 1929–30 freshmen were enrolled as students in the School of Engineering.

No. 19. Up to four years ago three years of collegiate pre-engineering work was required as a minimum for admission to the Engineering School. Four years ago a two-year collegiate requirement as a minimum was put into effect.

No. 21. ——

No. 23. ——

No. 24. ——

No. 25. The following changes have been made. The elimination of the Department of Arts and Sciences within which the engineering work was formerly conducted, making the School of Engineering a primary, instead of a secondary, division of the university organization.

Transfer of the Department of Architecture to the newly created Division of Fine Arts. The elimination of graduate courses in engineering. The elimination of the degrees of B.S. in chemical engineering, B.S. in chemistry, and B.S. in physics (some students who registered prior to 1928 are completing work for these degrees).

The establishment of a course leading to the degree of B.S. in engineering which will go into effect in 1930–31.

No. 26. ——

No. 27. Introduced the grade point system as one basis for rating and encouraging the production of scholarship. Increase in number of non-engineering courses. Equalized the number of hours work required in each branch of engineering. Course in building construction added as an option in civil engineering.

No. 31. In 1925 we had a five-year coöperative course with four week periods of which the first year was non-coöperative. In 1925 we reëstablished summer surveying camp.

In 1926 we made first two years non-coöperative. We made courses in physics and calculus stronger. We unified the first three years of instruction, making them identical in all curricula. We added a course in theory of structures to all curricula. We increased the hours in corporation finance. We transferred economics to the sophomore year. We added physical chemistry, electro-chemistry, and thermo-chemistry to Ch.E.

course. We strengthened C.E. courses in highways, and concrete. We increased M.E. course in machine design. We added concrete to M.E. and E.E. curricula.

In 1927 we standardized on 48 hours' combined recitation and preparation as one semester hour and rated all our credits to nearest ¼ semester hours. (We have 18-, 20-, 11-, and 7-week semesters.)

In 1929 we added a course in aeronautical engineering.

No. 32. Curriculum hours reduced. Common freshman year for all divisions. Highly technical subjects made elective. Addition of industrial options in M.E. and A.E. Cooperative system open to all divisions.

No. 33. Beginning in September, 1929, all curricula in engineering were reorganized on a five-year program (one year full time and four years coöperative) and the old four-year curricula were abolished. This makes possible the inclusion of more cultural subjects and the better distribution of technical subjects throughout the curricula.

No. 34. Foreign language has been dropped as a requirement for graduation. Allowing a greater degree of freedom in selecting additional economics and courses in business in our School of Commerce. Giving at the end of four years the degree of B.S. (in Eng.) whereas formerly the College of Liberal Arts granted the B.S. degree to our fourth year men. Allowing fifth year students for the degrees of C.E., E.E., M.E. and I.E. a greater degree of freedom as to electives.

No. 36. We have changed from a school requiring three years for graduation, summer quarter being included, to a school demanding four years for graduation, no summer quarter being required unless it is for failure in previous work. The three-year course requires no English or economics, while a four-year course demands that a student study nine hours of English and nine hours of economics for three quarters.

No. 38. Lessening the required courses of freshman year from 20 credit hours to 16½ credit hours. Doing away with foreign language requirements. Introduction of electives. Revision of coöperative work. Introduction of required business courses.

No. 39. The rearrangement of courses to equalize the different years. Drawing has been reduced to give surveying to all men. Certain laboratory courses have been added.

No. 42. The College of Engineering began to function in the fall of 1928 with five divisions of engineering—chemical, civil, electrical, mechanical, and petroleum. Mechanical engineering was comparatively new at that time, and petroleum engineering was really a course in petroleum geology fostered by the Department of Geology. The Division of Chemical Engineering has thus far been identified with the Department of Chemistry and will probably continue to develop that way. The professors of chemistry are on the staff of the College of Engineering as well as of the College of Letters, Arts, and Sciences.

In electrical engineering we have just employed a man to give special attention to radio and high frequency work and to develop experimental work in general for us. In mechanical engineering there has been a very definite demand for work in aeronautics, and we have added six courses in aeronautical engineering to our curriculum in that division. A year ago the course in petroleum engineering was completely revised and an outstanding man was appointed to conduct this work. Inasmuch as the university is located in the midst of the greatest oil field activity in the State, it seems especially appropriate to develop this work.

During a number of years we have discussed in our faculty meetings the matter of giving work which would fit men particularly for commercial and industrial work, and hence we shall have, beginning next fall, a course called General Engineering which will include the fundamentals of engineering training and enough work in economics and commerce to make our students useful in a commercial and industrial way. In the Division of General Engineering we have included such work as general engineering, drawing, mechanics, materials, and engineering economics.

No. 44. The introduction of a certain limited number of free electives and a reduction in the amount of time devoted to shop and design courses.

No. 46. Reduction in number of hours devoted to "shopwork" and increase in number devoted to mechanical drawing and mathematics.

No. 48. More attention given to aero-dynamics and aero-plane design.

No. 49. Beginning in September, 1930, no applicants will be admitted who do not present 1½ units in algebra and 1½ units in plane and solid geometry. Applicants for admission whose rank was in lowest third of high school class must pass entrance examinations in algebra, plane and solid geometry, English, a general intelligence test, and in 4 additional units selected from high school list of credits. Curriculum requirement in English raised from 8 to 10 units. Average grade required for graduation has been materially raised.

No. 50. ——

No. 51. Men with honor stand (B or better) allowed considerable latitude for independent work. Curricula have not changed materially during five-year period.

No. 52. (Explanation of credit hour.) A credit hour normally consists of one hour of classroom work or equivalent pursued each week for a semester of ten weeks. Two laboratory hours are considered equivalent to one classroom hour.

No. 54. ——

No. 57. No significant changes in educational policy. We are reviewing our curricula carefully at present and there may be changes within the year.

No. 58. ——

No. 61. Fixing on 17-hour semester. Eliminating foreign language requirement. Cutting down on drawing and shop time. Reducing required engineering hours and making more elective hours. Creating a basic, or "general engineering" course, required of all engineering (except Ch.E.) students, so that a student may take his B.S. in general engineering, and have his 26 elective hours free. If his major is E.E., M.E., or C.E., the faculty of engineering may require that 12 of his elective hours be spent in advanced work in his chosen field.

No. 62. None. Our curriculum has been developed during the past five years, and all courses in the senior year were offered for the first time this year.

No. 63. None, but now under consideration.

No. 67. An adjustment has been made in the curricula making room for electives as indicated above. A required course in economics has been arranged in the sophomore year with the thought in mind that it will serve as a prerequisite to elective courses in economics or business administration in the junior and senior years.

No. 68. Until 1927, all courses (except Ch.E.) were alike until the senior year. Now the differentiation begins with the sophomore year. This differentiation in the senior year will be increased somewhat next year.

No. 69. Trend to more work in economics.

No. 70. A combined 6-year engineering-law course, 3 in engineering and 3 in law. The fourth year taken in the Law School. Grades in engineering necessary for recommendation between B and C. A course in "transportation" combining work in civil, mechanical, electrical, marine, aero, economics, etc.

Each sub-department is considering a possible complete rearrangement of its undergraduate work, bearing in mind that there are in general three types of men to educate: (*a*) those who expect to go into industry generally, (*b*) those who expect to become "professional" engineers, (*c*) those who expect to go into research work. Probably the last two will need an extra year.

No. 71. Addition of chemical engineering and general engineering courses.

No. 72. The discontinuance of a general engineering course.

No. 74. All curricula have been made identical through the first two years. (Effective 1927–28).

No. 75. A student may, by the permission of his adviser and with the approval of the Dean, be relieved from a professional requirement and substitute a special problem.

No. 77. ——

No. 79. Tendency to include more business and economics in engineering curricula and to make the engineering courses more the teaching of fundamentals rather than of practical details. Gradually courses in economics (general) and engineering economics are being introduced. To make room for these courses some of the details of the engineering courses are curtailed and the courses shortened or even omitted.

No. 81. ——

No. 82. Practically none.

No. 83. ——

No. 84. In E.E., M.E., Mar.E., the elimination of required courses in pattern making (4 units) and machine shop (4 units). There are now required 4 units of "materials treatment" including heat treatment, welding, cutting, shop demonstrations in wood and iron, etc. The

requirement by State legislature of 2 units of American institutions was added two or three years ago.

No. 85. No marked changes.

No. 87. Qualifying test for entrance. Change in maximum and minimum hours that students in Engineering College may take. A student must take at least 14 credit hours and in general will not be allowed to take more than 19. If, however, during the preceding semester he obtains an honor point average of 2.5 he may be permitted to take as many as 20. If the average was 3, 21.

Concerning the honor point system, in the Engineering College the student must fulfill the requirements of the curriculum with a standing of 1 in order to graduate. Very few important changes have been made in curricula in the last 5 years. Some subjects given in the junior year have been changed to the sophomore year and a few minor subjects have been added. Changes will be made in the year 1930–31.

No. 89. Have placed in most curricula some electives to be devoted to English, economics, etc., as the student may desire. Total number of credits required for graduation reduced from 150–152 to 145–147.

No. 91. None.

No. 93. Removed history from freshman year and replaced it by physics. We now have in this year chemistry, engineering drafting, English, mathematics, military, physics, physical training—unification—progressive development.

No. 94. The senior year's work in public speaking has crystallized into the presentation, before the entire student body by the senior class, of two seminars at the close of each semester. These seminars, as they are called, consist in reproducing, as nearly as may be, a hearing or similar situation, the principal parts being taken by the seniors and some juniors. The freshmen make brief reports of these seminars. The entire term is spent by the seniors in preparing and collecting their material and developing their arguments.

No. 95. ——

No. 96. The most significant change that has taken place in our educational policy has been the increasing of the number of credit hours in the various curricula. For a number of years we have been operating on the basis

of a normal of 15 units or credits per semester. We have changed this policy and now our standard is 17 per semester or 136 credits for the Bachelor's degree. Curricula common for two years with minor variations in third year for civils, electricals and mechanicals.

Attention is called to the fact that in all divisions of the university, except Engineering, the normal required credit per semester is 15 hours. The increase to 17 hours per semester in the College of Engineering throws it out of step with other divisions of the university, but in comparison with the commonly accepted standards of engineering colleges throughout the country it is still below the average. Owing to these local conditions it is likely that the present requirement of 17 hours per semester is a maximum.

No. 97. Freshman Engineering Day has been in operation three years, with sufficient success to warrant the establishment of an all-university Freshman Day, just prior to registration. Freshman adviser is given more time for contact. Freshman orientation continues as a 1 hour course throughout the year. After 10 years of evolution, this appears as a fixture, in the form of general lectures, demonstrations, exercises, experiments. It is not a problem course.

No. 98. Less insistence on particular courses and more general cultural and scientific courses.

No. 99. ——

No. 100. ——

No. 101. Reduction in semester hours required for graduation and reduction in the number of subjects the student is pursuing at one time; greater attention to the individual student.

No. 102. Up to 1927 differential calculus was taught in the spring term of the freshman year. Beginning with the fall of 1927, calculus was made a sophomore subject, a freshman orientation course was introduced, general economics was added to the sophomore year and some other minor changes made in the curricula. The total number of semester hours required for the engineering degrees was reduced from about 152 to 144.

We are now engaged in a general revision of all the curricula with a view to bringing them still more nearly in line with the fundamental principles laid down by the Board of Investigation and Coördination of the S. P. E. E.

No. 104. No changes in theoretical essentials. Modern language dropped to satisfy necessity for more time in technical fields.

No. 105. Marked development in chemical engineering. Facilities in ceramics have been greatly increased. Full option and new laboratory for sanitary engineering. Changes in mechanical engineering to provide additional optional work in mechanical engineering power and electrical engineering. Greater emphasis on economic content of courses. Minor changes in all curricula.

No. 106. Free electives have generally been increased.

No. 107. Findings of the S. P. E. E. used as a guide in changes still in progress.

No. 111. A general scrutiny of all subject matter and elimination of obsolete material. Emphasis of motivation courses in the freshman year. Increase in amount of economics and history.

No. 112. Elimination of thesis requirement in all curricula. Introduction of electives in nearly all curricula. Reduction in number of credit hours required for graduation (average requirement for graduation is two credit hours less than it was five years ago).

No. 113. Installation of specialized courses in highway, sanitary and metallurgical engineering.

No. 114. All mathematics given in first two years. Applied mechanics given by technical department. Time given to economics increased and placed in sophomore year. Elementary geology dropped. Public discourse added. Descriptive geometry added.

No. 115. Extension of elective system. Curricula have been revised in harmony with the recommendations of the Society for the Promotion of Engineering Education.

No. 117. Have reduced technical and increased general subjects.

No. 118. Reduction in credit hours required for graduation from 225 to 204. This was done four years ago.

No. 119. ——

No. 120. Engineering curricula have been reorganized for the purpose of strengthening the sequences in the engineering science and technology group and for the purpose of introducing a group on economics and administration apart from the engineering angle in the senior year. The freshman instruction has been organized for the purpose of orientation and courses have been grouped in a common curriculum for the de-

partments of mechanical, electrical, and civil engineering. A staff committee has been working upon the development and correlation of the work in the common freshman year. Another committee has made a study for the purpose of improving all matters pertaining to classroom instruction. Personnel work with educational and vocational counsel is being rapidly developed.

No. 121. The standards for entrance have been raised very definitely by accepting only those students who stand in the first or second fifth of their high school class, and requiring them to pass examinations if they stood lower than the second fifth of their high school class. The registrar states that about half of those taking entrance examinations have failed.

No. 123. ——

No. 124. The elimination of freshman shop work and the substitution of a course in "engineering problems."

No. 126. Entrance requirements raised from 15 to 16 units. Mathematics requirements raised from 3 to 3½ units. Age of special students raised from 20 to 23 years. Work in physics and economics increased. Curriculum in commercial engineering changed to industrial engineering. Options introduced in senior year of nearly all curricula. Architectural engineering added. Ceramic option offered in mining engineering.

No. 127. ——

No. 128. ——

No. 129. Degrees other than the mining and metallurgical first offered within above period.

No. 130. The curricula in metallurgical and geological engineering have been differentiated from an all inclusive course in mining engineering. We have in progress a thorough restudy by faculty of all curricula and will probably reduce somewhat the requirements for graduation, i.e., the number of hours.

No. 131. ——

No. 132. None.

No. 133. None, other than a gradual stepping up of the engineering and scientific content of the curriculum with a corresponding reduction of the requirements as to cultural courses.

No. 134. During the past five years there have been added to the engineering curriculum courses in mechanical, elec-

trical, ceramic and chemical engineering by the co-operative plan.

No. 135. Normal changes.

No. 136. None.

No. 137. An increase in time given to English, economics and business, the laboratory, and testing equipment has been greatly increased and better instruction provided. The courses of instructions are being studied by a special committee of the faculty with expert advice from the outside. This study by special committees and final action by the faculty will probably result in changes.

No. 138. Changing from a two-week alternating period to a three-week alternating period—then to a nine-week alternating period.

No. 139. There have been no radical changes in policy or curricula during the last five years. Minor changes in technical courses are made from time to time as changing practice requires. Slight changes in the electives have been made. At the present time history is the predominant elective. The course in aeronautic engineering was offered for the first time in September, 1929. Since it utilizes the same foundation courses as the other departments and also includes some technical courses given in other departments, there will be a senior class of aeronautic engineers ready for graduation in June, 1931.

No. 140. Introduction of special sections in economics and accounting primarily planned for engineers, more freedom for election in course given in junior and senior years.

No. 141. ——

No. 142. The elimination of the subcollegiate course 1924 (Sept.). Increase of 20 hours (credit) for B.S. degree in curriculum. Increase from 50 to 55 m. period of recitations. College algebra and plane trigonometry with college credit are required (4), elementary economics (3), English (6) and other technical subjects to make up 20 hours.

No. 143. The introduction of a course in physical computations which was suggested by a close study of the engineering colleges of England and Scotland. It was felt strongly that our boys did not have sufficient sustained computations. Also, I have mentioned the course in English. Following the educational philos-

ophy of John Dewey, we are of the opinion that it is very wise to have our college course here a cross-section of engineering life itself. Our course in English consists of a course in lectures in industrial history in the development of engineering; a list of readings for engineers which contain some classical engineering work. This furnishes the background. The young man is asked to write, write, write, write, write—a good deal of the writing being done under supervision following the principle that the only way to learn how to write is to write.

Each week, the entire freshman class is assembled with considerable formality and half a dozen papers are delivered and discussed formally by the convocation, adopting the same method as you would find in an engineering society. The results have to me been astounding, and we are gradually adding to the time spent so that ultimately we may hope to reach a 44 hour week. Much of the work done at home is done now within the college walls.

Again we are striking at the cross-section of real engineering life and I see no reason why, if we are willing to run a 44 hour week, that we should not get much of the work done within the daylight hours. From the standpoint of physiology, psychology and sociology, this would be a tremendous benefit and will solve many of the problems which have to do with lack of time and failure to apply.

No. 145. None; however, definite changes are planned and will be begun next year. (Note: We have formulated the curricula for degrees based on two years' straight college work, followed by three years on the coöperative basis. This will be put into effect beginning with our present freshman class, and will require 153 hours for graduation.)

Have any experiments in teaching methods been conducted?

No. 1. No.

No. 2. Supervised study in physics—sectioning according to attainment.

No. 4. No.

No. 5. ——

No. 7. ——

No. 8. ——

No. 10. Interesting suggestions have resulted from constant study of the regular faculty committees on graduate courses

and scholarships, and on undergraduate courses, and from a recent survey by a student committee. As a result of the latter there has been appointed and operative for two years a standing faculty and student committee for consideration of courses of instruction, teaching methods, etc. This committee's suggestions and findings have resulted in desirable changes. As far as we know this is the first instance of continuous and successful coöperative effort in which the undergraduates have borne so large a share. The operation of "honors" groups in some departments has proved very successful. The desirability of extension of this feature is clearly evidenced.

No. 11. No radical experiments.

No. 13. ——

No. 15. ——

No. 16. The experiment of having small divisions in mechanics meet informally around a table in place of regular recitations has been tried. The result has not been considered particularly successful as compared with the recitation. A change was made this year in teaching descriptive geometry. Recitations were dropped. One lecture per week followed by two two-hour drawing periods substituted. Results so far very satisfactory.

No. 17. ——

No. 18. None.

No. 19. ——

No. 23. ——

No. 24. ——

No. 25. ——

No. 26. ——

No. 27. True-false system is being tried in several courses.

No. 31. Courses in corporation finance and engineering law revolve largely around the case problem method; one half the scheduled time, approximately, is devoted to theory; the remainder to the application of the theory to case problems, the material for which comes from actual problems taken, largely, from the industrial community from which the student experience has been drawn.

The following experiments are being conducted:

1. Business English, a subject for upper classmen, will use as its material the reports submitted in corporation finance and engineering law.

2. The course in engineering problems will draw its material largely from the industries now coöperating with this institution in the training of engineers.

No. 32. The School of Education undoubtedly could furnish valuable information, but there is nothing new in College of engineering.

No. 33. ——

No. 34. No.

No. 36. It is not possible with our small staff to make any new experiments in teaching methods of this nature. Therefore no studies of this kind have been attempted.

No. 38. We have been experimenting with visual methods in parts of some courses, and believe this method takes the place of certain descriptive work.

No. 39. None.

No. 42. We have found the inspection trip program mentioned in the orientation of freshman students particularly worth while since we require written reports from the students after each trip. This has been found to stimulate the student's interest in what he sees and makes him more alert during the progress of the trip in getting material for his report.

No. 44. ——

No. 46. ——

No. 48. No.

No. 49. ——

No. 50. ——

No. 51. ——

No. 52. ——

No. 54. None.

No. 57. We have experimented with the objective type of examination to some extent and with fair success.

No. 58. ——

No. 61. ——

No. 62. None.

No. 63. ——

No. 67. We are using the Iowa Placement Tests as follows: Mathematics training, English training, and physics aptitude, and are sectionalizing the classes wherever possible. The following averages on Placement Tests at time of entrance last fall may be of interest in this connection.

	Mathematics	English	Physics
Freshman class	46.62	44.31	66.09

Freshman group who failed during the fall quarter.	32.11	35.44	55.11

No. 68. ——

No. 69. ——

No. 70. A committee has charge of general matters relating to teaching and reports periodically to the faculty. Department of Drawing and Mechanism has and is conducting certain experiments. For freshmen who show signs of difficulty in their work attendance is required at a short period course in "How to Study."

No. 71. None.

No. 72. ——

No. 74. None.

No. 75. No.

No. 77. ——

No. 79. No radical experiments have been tried. Daily short quizzes have been tried with benefit in some of the larger classes.

No. 81. The most important experiment in teaching method is that of being carried on by Prof. C. C. More and his associates in the field of mechanics and structural engineering. Professor More developed the problem method and started the present movement for freshman problems courses. He is conducting his experiments along this line with remarkable success.

Another noteworthy experiment has been made in teaching freshman drawing. Prof. F. M. Warner uses the first quarter for pencil sketching, lettering, orthographic projections, etc., and the use of drawing instruments is not taken up until the second quarter. His course in descriptive geometry is also handled as a drafting problems course. He devotes only a few periods to the matter of rotation.

No. 82. No.

No. 83. No.

No. 84. None worthy of mention.

No. 85. ——

No. 87. This matter has been discussed by the Dean and heads of departments. No experiments have been conducted.

No. 89. None other than noted under (1) above.

No. 91. No experiments along this line have been conducted.

No. 93. Lectures on teaching methods by the head of the Department of Psychology have been given before the engineering faculty. Various teachers have tried and are trying out various expedients and methods in teach-

ing. We are experimenting with the honors group plan. We discuss teaching methods in our local S. P. E. E. meetings.

No. 94. ——

No. 95. An experiment in class size in mathematics has been undertaken; not completed. (Another one in physics showed no advantages or disadvantages to justify conclusions, in my opinion. Published by Earl Hudelson.)

No. 96. In certain subjects in the Mechanical Engineering Department an attempt is made to provide for the progress of the other members of the class. In order to do this a considerable portion of the work is based upon individual assignments in which general principles are stated and illustrated, with necessary references, problems assigned and questions asked to direct the thought of the student. The student is required to make a definite plan of procedure before beginning on his problem and makes a report when he has finished. New problems are then assigned. Requiring a definite plan of procedure reduces errors, saves time, and enables teachers to handle larger groups. An extension of this experiment is contemplated. The case or project method is largely used in civil engineering.

No. 97. ——

No. 98. No.

No. 99. A laboratory period in mechanics has been used for three years, in which students work problems. This has not seemed to be an advantage and is being discontinued. Advanced mathematics is being given to a selected group of juniors in electrical and mechanical engineering. This is proving helpful in teaching mathematics to sophomores since the upper classmen are using their mathematics to a greater extent in their engineering work. Freshmen are classified for mathematics by the Iowa tests and sectioned into three groups—fast, medium, and slow. The three groups cover the same ground by meeting in class four, five and six hours per week respectively. Success of plan not established. Instructors about evenly divided for and against it.

No. 100. ——

No. 101. New grading system. Special attention to superior students. Studies in teaching methods. Semester examinations. Student personnel studies. Studies of freshman placement tests. Experiments with double-pace sections. Orientation of freshmen. Studies in

higher education VII and IX include additional information.

No. 102. No.

No. 104. No.

No. 105. Several years ago a freshman section was formed for those who were found to be very slow or deficient in mathematics. The number of recoveries at first seemed promising, but time proved that such a small percentage made good, that the plan has been discontinued.

No. 106. Sectioning on the basis of ability has been tried in the Departments of Mathematics, Mechanics, and Electrical Engineering. The practice has been discontinued in mathematics and mechanics but is still in use to a limited extent in electrical engineering. All freshmen in the university take elementary English. In this course, the students are placed in A, B, and C sections, according to ability and previous training.

No. 107. No.

No. 111. No.

No. 112. None that appear to be of importance.

No. 113. No.

No. 114. ——

No. 115. Experiments are under way to determine the relation between class-size and teaching efficiency. The tendency is to increase the size of classes. Experiments with two-hour problem periods in mathematical subjects have proved very satisfactory. The Purdue rating scales for instructors have been used with significant and beneficial results especially when all staff members of a given department have coöperated in studying the results of the student ratings.

No. 117. Not in School of Engineering.

No. 118. ——

No. 119. No.

No. 120. No controlled experimental work has been done in teaching methods. The freshman engineering part of instruction has, however, been a very satisfactory demonstration. The schools have been very stimulating to the improvement of instruction in the courses of those who have attended and have introduced the study of instructional methods to the entire staff through the reports of those returning from them.

No. 121. ——

No. 123. No organized or large scale experiments. Individuals

and departments have been trying problem courses. Use of computing periods, etc.

No. 124. ——
No. 126. ——
No. 127. ——
No. 128. ——
No. 129. ——
No. 130. Less lecturing, more studying. Results satisfactory.
No. 132. None.
No. 133. None.
No. 134. No.
No. 135. No.
No. 136. ——
No. 137. In some of the senior work we are substituting the lecture system in a few courses.
No. 138. ——
No. 139. None.
No. 140. The text and methods in mechanical drawing have been changed this year. It is still too early to say whether the result will be satisfactory but it appears to be meeting the requirements. In some of the senior courses, we have tried the scheme of giving the students a general topic and meeting the group at infrequent intervals (something like honors courses). This has not been particularly successful and the regular tri-weekly meeting seems better. We have also assigned different men to take charge of the class group on different days and to handle the topics assigned for that day. This has been more successful than the other method.
No. 141. None.
No. 142. ——
No. 143. We are experimenting at the present time with the question of instruction in alternate periods rather than with continuous instruction. We believe that the examinations at the end of the period to be worthless. We are, I think, finding that emphasis on a few fundamental things is sound, but the multiplication of technical applications is absolutely unsound. We experiment concerning the teaching of mathematics, especially calculus, and we are giving most of our calculus at the present time as a part of our course in analytical mechanics. Again, it seems too simple to mention, but there seems no way to force young and immature students to form abstract concepts or reason abstractly. We are beginning to feel that the method

of alternate periods of instruction has some very definite and lasting advantages over a continuous method. A continuous method, is, we believe, somewhat akin to cramming and if the course is lengthened somewhat and given an alternate period, a professor or instructor is forced to good teaching methods, and the student gets something which he retains certainly a few weeks after the final examinations of the subject.

Our experiments seem to have proven that it is a huge joke to test a man's ability within a day or two after the course is finished and indications would point to the fact that, if his ability were tested five years after the end of the subject, he would retain mighty little of it under our present method of instruction.

No. 145. No.

What significant changes have taken place in the last five years regarding the number and quality of graduate courses?

No. 1. No graduate courses.

No. 2. Five years ago a curriculum leading to M.S. degree in chemistry was the only graduate activity. Last year curricula were added leading to the Master's degree in civil, electrical and mechanical engineering and this fall another in chemical engineering. Three years ago seven courses were given and now twenty-one courses are given, both excluding supervision of thesis work. All of these courses are given during the evening hours and a few in the daytime.

No. 4. The number of graduate courses given at night is increasing steadily. Some graduate work is being done now in day courses, notably in metallurgy.

No. 5. The number of graduate students in any of the last five years has been quite small so that very little graduate work has been done on other than a personal basis.

No. 7. No graduate courses.

No. 8.

No. 10. A complete revision of all courses given, into three classes: (1) Undergraduate—not counting towards higher degree; (2) Graduate and Undergraduate—courses of fourth year or senior grade; (3) Graduate—open only to graduate students (except with special consent of registration officers). For the Master's De-

* *Ibid.*, page 333.

gree 75 per cent of the work *must* be elected from group (3) as a minimum, 25 per cent *may* be chosen from group (2). The number of strictly graduate courses has been and is being extended annually. In 1929–30 a total of 321 graduate courses were listed in both terms by all departments at the Institute (as many courses in the second term are continuations of courses in the first term the number of subjects offered as graduate courses is considerably less than the figure given above).

No. 11. None—more given.
No. 13. ——
No. 15. None, save greater emphasis placed on chemical engineering.
No. 16. None.
No. 17. ——
No. 18. None.
No. 19. ——
No. 21. ——
No. 23. ——
No. 24. ——
No. 25. ——
No. 26. ——
No. 27. At present do not offer graduate courses in engineering.
No. 31. None.
No. 32. There are no graduate courses in engineering except those offered in Aeronautical School, where a fifth year in residence is required of those seeking the Aero.E. degree.
No. 33. No graduate courses are offered by the School of Engineering.
No. 34. The annual increase in graduates has been approximately 20 per cent. Approximately 55 per cent of our fourth-year graduates return to complete the fifth year for the degrees of E.E., C.E., M.E., and I.E. In the fifth year and fourth year more courses in economics and commerce are allowed.
No. 36. Graduate courses are not given at the University.
No. 38. Through a coöperative agreement with the Westinghouse Electrical and Manufacturing Company we conduct with them a coöperative graduate school in engineering, with an enrollment of about 250 graduate engineers and a varied curriculum. Many of the mature engineers of the company are on our staff as lecturers.

No. 39. Our graduate courses have been offered for the last five years only. The number is the same as that first offered. Our enrollment is increasing.
No. 42. ——
No. 44. None.
No. 46. None. We have had no resident graduate students in engineering for a number of years. Each year we have one or more graduates who are awarded the professional degree of mechanical engineer, civil engineer, electrical engineer, chemical engineer on the basis of their professional experience and an examination and thesis.
No. 48. ——
No. 49. None. Plans now being matured to develop graduate courses of instruction in all departments.
No. 50. ——
No. 51. There has been a distinct increase in the requirements in the direction of greater rigor.
No. 52. ——
No. 54. ——
No. 57. We do not offer graduate courses.
No. 58. ——
No. 61. ——
No. 62. One graduate course was offered this year. This is the first attempt to give graduate work in the School of Engineering.
No. 63. No graduate courses.
No. 67. The number of graduate courses has been increased, and much of the work has been increased in difficulty.
No. 68. They have been extended and more closely defined.
No. 69.
No. 70. Several new courses added in higher work in mechanics (also given in Summer School). Additional graduate courses in electrical, chemical.
No. 71. None.
No. 72. ——
No. 74. No considerable changes.
No. 75. ——
No. 77. ——
No. 79. Relatively few graduate courses are given. There is a tendency to emphasize mathematics in the graduate work in engineering.
No. 81. ——
No. 82. Began to offer a unique course (graduate) in the administration of mineral industries.

No. 83. Not giving graduate work in engineering at present.

No. 84. Little change except for an increase in the number of courses and a strong tendency to encourage graduate study.

No. 85. ——

No. 87. Until the year 1927–28 practically no graduate work was done in the College of Engineering. In that year through the provision of three graduate fellowships, one each in civil engineering, physics, and chemical engineering, an interest was started in graduate work. Regular graduate courses were offered during 1927–28 and 1928–29. Graduate students other than those awarded the graduate fellowships have been taking the advanced work leading to the degree Master of Science.

No. 89. The number of such courses has been increased considerably. The requirements now demand a higher quality of work.

No. 91. Several graduate courses in mining and metallurgy have been added.

No. 93. More courses of high quality have been added.

No. 94. ——

No. 95. ——

No. 96. No changes have been made of any importance, except that these courses are being more and more elected.

No. 97. They have all been surveyed by the Graduate Council, both as to content and instruction. Prerequisites have been more clearly defined, and distinctions drawn between graduate courses and advanced undergraduate courses.

No. 98. All that we have, have been added in the past five years. We have a few strictly graduate courses.

No. 99. In order to fulfill the objectives of the Graduate School, that is to "meet the needs of superior students who are preparing to become teachers in colleges or universities, or investigators, and to offer opportunities to qualified students for a more advanced training than they can obtain in an undergraduate course," the last five years was marked by a restriction rather than an expansion of graduate work. The number of departments represented in the graduate bulletin as offering graduate courses for major work towards the Master's degree has been reduced from 22 to 14. The number of courses in these departments has not been increased very much. The quality has been improved, particu-

larly in the science departments. Considerable emphasis has been placed upon the requirement of a valuable thesis. In most cases the theses have been accepted for publication in reputable periodicals.

No. 100. ——

No. 101. Increased in quality and variety.

No. 102. None.

No. 104. Graduate Department of University incorporates graduate work in engineering.

No. 105. Additional courses in chemical and sanitary engineering.

No. 106. Considerable enlargement in facilities and number of courses.

No. 107. Number of courses offered has been reduced.

No. 111. Engineering graduate work here is finding itself and the subject matter of graduate courses is being placed on a truly graduate basis with emphasis on the truly research type of work. Introduction of courses and facilities for work leading to the doctorate.

No. 112. Number of courses listed in catalog about the same. Courses are better organized and more are being actually given.

No. 113. ——

No. 114. ——

No. 115. None.

No. 117. Number about same. Quality much improved.

No. 118. ——

No. 119. Graduate work was not offered five years ago. At the present time complete graduate and Masters' degrees are offered in the Departments of Industrial Arts, Education, and Vocational Education. Arrangements will be completed to offer a Master's degree in the Department of Mechanical Engineering within the next year. The number of graduate students is small at the present time but prospects are indicating a considerable increase in the coming year.

No. 120. There has been a slight change in the number of graduate courses. Few students have taken graduate work in the past but a new plan of fellowships in the engineering experiment station has increased the graduate work materially. It seems quite probable that this work will not develop extensively beyond those groups which are working upon particular problems in the experiment station which have special significance to the State of Oregon, and who are employed upon a half-time basis. With the development of the engi-

neering experiment station and research work upon problems of significance to the State, the need for part-time assistance and the strength of student interest in research problems will gradually increase the amount of graduate work offered. It will, however, be some time before graduate students will be enrolled in such numbers as to require the organization of graduate classes in specific courses. Graduate work at the present time is carried on with instructors acting as tutors and counselors and because of the ability of those assigned to graduate instruction, it is carried forward at a high level of efficiency.

No. 121. The number of graduate courses has increased only moderately. Graduate students have been restricted in number, and only the best have been accepted. Students from Germany have applied and have been accepted.

No. 123. ——

No. 124. The number of graduate courses has been somewhat increased and their quality has undergone a systematic improvement. Effort has been made to more nearly correlate the graduate subjects so that they would fall more or less into groups with a definite objective.

No. 126. Graduate courses increased from 24 to 63. Quality improved by more definite organization and greater demand for graduate work. Number of graduate students increased from 4 to 16. Better organization for graduate research. Six part-time graduate research fellowships now available.

No. 127. ——

No. 128. Each department has added, at different times, new courses both academic and in research work.

No. 129. Graduate courses offered for first time within this period.

No. 130. Graduate work inaugurated this year for the first time.

No. 131. ——

No. 132. None.

No. 133. No graduate courses offered.

No. 134. There has been a considerable increase in the number of graduate courses offered in the following departments: Mathematics, Physics, Chemistry and Textile Engineering.

No. 135. No graduate courses.

No. 136. No graduate work at present.

No. 137. No graduate courses.

No. 138. Do not give graduate work.

No. 139. The College of Engineering and Commerce and the School of Applied Arts of the university offer opportunities for graduate work in engineering, commerce, the applied arts, and in the basic sciences of those branches, leading to the appropriate professional graduate degrees.

No. 140. No graduate courses offered in engineering. The school is small and no attempt has been made to work up a graduate department. Under Professor C. B. Andrews, work has been started in a small way on soil mechanics. Last year the course was offered in the evening and was elected by a number of practicing engineers. This year the work offered is along the physical science side but next year we plan to offer a course on concrete for practicing engineers. We have only a small number of prospects for such courses and must concentrate on different lines during each year.

No. 141. None.

No. 142. ——

No. 143. We do not offer any graduate courses in engineering.

No. 145. No graduate work in engineering.

Where is the administrative control of graduate work placed and how is it supervised?

No. 1. ——

No. 2. The planning of the graduate courses was carried out by a Committee on Graduate Study and the supervision of the work is placed with the Dean of the College who is also Director of the Evening Session.

No. 4. Placed in Educational Senate, and supervised by the Committee on Graduate Degrees, consisting of one representative from each college.

No. 5. The control of graduate work is placed in the hands of a Committee on Higher Degrees and the Dean. We give only the Master of Science degree.

No. 7. ——

No. 8. ——

No. 10. All graduate work is in charge of a Faculty Committee on "Graduate Courses and Scholarships"; membership consists of one member from each Department Committee on Graduate Students—about 16 members in all. Dean of Graduate Students is Chairman. Department Committees present recommendations for degrees to the Graduate Committee which, in turn,

recommends to the faculty. Committee acts with power on approval of graduate courses and on award of graduate scholarships and fellowships.

No. 11. Committee of the Faculty.

No. 13. ——

No. 15. With heads of appropriate departments.

No. 16. In the Graduate School, supervised by the Engineering Division which reports to the Dean of the Graduate School.

No. 17. Administration control resides in the Committee on Advanced Degrees and supervision is directed by heads of departments.

No. 18. The administrative control of graduate work is under the faculty of engineering. Each head of a department is responsible to the faculty for the graduate work in his department. In the Engineering School, the department head is in all cases the major professor.

No. 19. The final year of the engineering course is graduate work in the sense that it is taken by students who already have the B.S. degree, but is an extension of the professional course in engineering and is under the control of the School of Engineering. Specialized graduate work in engineering subjects such as is taken by candidates for the M.A and Ph.D. degrees is under the jurisdiction of the Faculty of Pure Science, not under the Faculty of Engineering.

No. 21. ——

No. 23. ——

No. 24. ——

No. 25. ——

No. 26. ——

No. 27. ——

No. 31. We give professional degrees Ch.E., C.E., E.E., M.E., and A.E. for three years' professional experience and a thesis, to such of our graduates as care to do the work.

No. 32. All graduate work, except under 3 above, is at present under the Graduate School of the University, where no degrees in engineering are given. There is one policy, recently adopted, where graduates of other technical schools seeking credit for advanced degrees at their own alma mater, may take courses at the Graduate School here, such as in higher mathematics and physics, and then have such credit transferred to the Col-

lege or University affected, for recognized credit toward their degrees.

No. 33. ——

No. 34. The fifth-year work is under the control of the Dean and the teachers having rank of "Professor.".

No. 36. The only graduate course that is offered at the University is that of the professional M.E., E.E., C.E., or Ch.E. The requirements for this are as follows: Three years after the student leaves college he is required to undergo a special oral examination after writing an acceptable thesis. The administrative control of this course is vested in the Dean of the College of Engineering and the department head who is most concerned with a special examination and preparation of the thesis.

No. 38. The administrative control is through the Graduate School of the University. The actual and technical control of the work is through the department heads of the Engineering and Mines Schools.

No. 39. Graduate work for one year, leading to degree of C.E., E.E., M.E., or Ch.E., is under the faculty of the School of Engineering, supervised by professors of school.

No. 42. ——

No. 44. Graduate work is under the control of the Dean of the Graduate School, but is under the direct supervision of the head of the department in which the major work is taken.

No. 46. With the Dean and Faculty of the Graduate School.

No. 48. ——

No. 49. It is under the Faculty and Dean of the School of Graduate Studies.

No. 50. ——

No. 51. It is under the general and final control of the Board of the Graduate School of Yale University. A special committee consisting of the Chairman of the Engineering Division (the associated engineering departments) and four of the engineering professors acting as a committee on higher degrees have direct supervision of graduate work. To this committee the individual departments report as to the work in their respective departments.

No. 52. ——

No. 54. ——

No. 57. No graduate engineering work offered.

No. 58. ——

No. 61. ——

No. 62. All of the graduate work in the University is placed under control of the Dean of the Graduate School and the Graduate Committee.

No. 63. ——

No. 67. The administrative control of graduate work is placed with: The Dean of the Graduate School; the Executive Committee of the Graduate School; the Engineering Graduate Committee; the heads of the departments.

No. 68. Administration in the departments and in the faculty of this college so far as nature and extent of courses are concerned. Registration is with the Dean of the Graduate College. A graduate committee of this faculty composed of all full rank professors has immediate supervision of graduate work.

No. 69. In the hands of the Graduate School of the University. Students majoring in engineering supervised by head of engineering department in which major is elected.

No. 70. Control is in the hands of the Dean of the Graduate School. Supervision by a separate committee appointed to be responsible for each student, so far as work, examinations and recommendations are concerned.

No. 71. None done at present.

No. 72. ——

No. 74. By faculty of College of Engineering.

No. 75. Administrative control of graduate students is under the supervision of the Dean of the Graduate School and supervised by the professor under which the work is taken.

No. 77. ——

No. 79. Work is carried on in the separate departments but a graduate student must register with the professor appointed to act as a dean of graduate students.

No. 81. ——

No. 82. In a Graduate Study Committee.

No. 83. All graduate work of University is under control of Graduate Council, the administrative officer of which is the Dean of the Graduate School.

No. 84. Control is vested in the Dean of the Graduate Division. Supervision is by regular members of the faculty offering courses, under the direction of department chairmen.

No. 85. All graduate work is centered in the Graduate School but each college has, of course, an interest in its own graduate work as well. Each graduate student elects his

own committee subject to general supervision of the central committee of the Graduate School.

No. 87. The Graduate School is under the direction of the Committee on Graduate Studies. This committee consists of the Dean of the College of Arts and Sciences, Agriculture, Engineering, Commerce and Journalism, Law, Pharmacy, and Teachers College and the Vice-President of the University. The Chairman of this committee has been the Dean of the College of Arts and Sciences. At the present time only courses leading to the degrees of Master of Science and Master of Arts have been offered. Starting with the college year of 1930–31 there will be an organized Graduate School under full time Dean and courses leading to the Ph.D. degree will be offered.

No. 89. In graduate council and Dean of Graduate School. Back of these the general faculty of the University and the Academic Council. The Academic Council is composed of the Deans of the various schools, President, two members elected from the faculty.

No. 91. The Dean of the Graduate School, the Dean of Engineering and the head of the department concerned arrange the program for each graduate student. The work in each course of study is supervised by some individual member of the staff selected by the head of the department.

No. 93. The Dean of Graduate Study is administrative head. Graduate faculty and head of the department concerned supervise the work. The Dean of the college concerned recommends the candidate for the appropriate degree.

No. 94. ——

No. 95. Graduate School. Dean and Executive Committee. Committees for various groups of subjects (as "Physical Sciences and Mathematics").

No. 96. The graduate work is under the control of the faculty as a whole. The outline for the graduate year is planned by the department and adopted by the faculty so that all students pursue a regular curriculum. None of our advanced engineering work is taken under the direction of the Graduate School. Our graduate year is outlined in the same manner as the undergraduate with regular advanced subject matter and about forty to fifty per cent elective.

No. 97. A graduate college Dean, administrator. A graduate college faculty, nominally in control, but seldom meeting. A graduate council created by the faculty, and acting in the double capacity of a legislative body and an executive body. It establishes rules of procedure and standards of excellence. It passes upon the sufficiency of courses for graduate rating. It approves or disapproves for graduate instruction the personnel recommended by departments. Departmental graduate committees (*e.g.*, Engineering) which examines proposed student programs and recommends approval by Dean when satisfied that the complete program is of proper grade and homogeneity. Departmental adviser, appointed individually for each graduate student.

No. 98. Graduate Committee.

No. 99. Graduate work is offered, under the supervision of the Dean of the Graduate School, by competent members of various departments of instruction and research. These members constitute the faculty of the Graduate School. The general administrative functions of the faculty are delegated to the Dean and the Council.

No. 100. The administrative control of graduate work is placed in the Graduate School and the work is supervised by the professor under whom the major is carried.

No. 101. Graduate Council headed by Dean of Graduate School.

No. 102. University Committee on Graduate Work, supervised by department heads.

No. 104. Committee on Graduate Study.

No. 105. At present under a committee on graduate work for general supervision. Direct supervision by the college. The Graduate School is in the process of reorganization and all engineering work will be included in the industrial and science group. A chairman for this group has been elected effective 1930.

No. 106. By a graduate faculty and a Dean of the Graduate School.

No. 107. Graduate Committee. Major professor.

No. 111. In the Dean of the Graduate College with a committee in the Engineering College to correlate with the Graduate College. Essentially the character of the graduate work in the College of Engineering is directed by the Dean of Engineering.

No. 112. Administrative control of graduate work lies with the Graduate Council. Programs for graduate students are prepared by the major instructors under general

regulations prescribed, and are subject to approval by the Graduate Council.

No. 113. Graduate Committee.

No. 114. Committee on Graduate Study. Dean of school. Head of department.

No. 115. The administrative control of graduate work is in the charge of a graduate committee.

No. 117. Dean of Graduate School, Graduate faculty and head of department in which student majors.

No. 118. ——

No. 119. The administration of the graduate work is invested in the Dean of the Graduate School, who is responsible for setting the standards of the work of the department. Each department is responsible for building up its curriculum and seeing that the necessary courses are offered. The Dean of the Graduate School has an Advisory Committee consisting of a representative from each of the six divisions in the college offering graduate work.

No. 120. The control of graduate work is placed in the hands of a graduate committee but the responsibility for the thoroughness and efficiency of it remains with the department in which the degree is received. The standard of graduate work has been raised by the supervision in the Engineering School and by a common policy accepted within that school.

No. 121. The Graduate School consists of those who offer accepted courses in graduate study. The Graduate School, presided over by a Dean, passes on graduate courses and approves recommendations for degrees.

No. 123. ——

No. 124. The Dean of the Graduate School supervises the graduate work with the advice of the Graduate Council.

No. 126. Control in committees of six members—"Committee on Graduate Programs and Degrees." This committee unifies practices; encourages and passes an offering of courses; passes on programs of study of graduate students; and recommends granting of degrees.

No. 127. The work in the Graduate School is carried on under the supervision of the Committee on Graduate Studies. This committee is headed by the Dean of the Graduate School. The Engineering College has one member of this committee.

No. 128. In a Faculty Committee.

No. 129. Supervised by the head of department concerned.

No. 130. Graduate Committee, to whom heads of departments giving graduate work are responsible.

No. 121. ——

No. 132. Under head of department in which the degree is to be secured.

No. 133. No graduate work offered.

No. 134. The graduate curriculum is under the control of a committee consisting of the Dean, Registrar, and the heads of the degree-granting departments. The head of each department supervises the work of his own department.

No. 135. ——

No. 136. No graduate work at present.

No. 137. No graduate work.

No. 138. ——

No. 139. In addition to the usual research work in connection with the various departments of the College of Engineering and Commerce and the School of Applied Arts, an Institute of Scientific Research has been organized in which to carry on definite types of research work of fundamental character connected with basic industries. At the present time the Institute of Scientific Research consists of five major units: 1. The Research Laboratory of the Tanners' Council of America. 2. The Commercial Club of Cincinnati Research Survey. 3. The Research Laboratory of the Lithographic Technical Foundation. 4. The Basic Science Research Laboratory. 5. The Sound Research Laboratory.

(Quoted from catalogue.)

No. 140. All graduate work of the University is under the control of a committee on graduate work and the administrative work is handled by the Chairman of the Graduate Work Committee. The general committee selects for each candidate a special faculty committee. At present there are no candidates in engineering.

No. 141. None.

No. 142. ——

No. 143. ——

No. 145. ——

Research and Publications *

Number of Institutions Reporting	80
a. Number of Research Fellowships	234
b. Number of Part and Full Time Assistants	511
c. Number of Published Bulletins	600 (Approx.)
d. Reported Expenditures for Research	$1,301,871

* *Ibid.*, page 330.

A complete report of research in engineering colleges has been prepared under the direction of Dean R. A. Seaton, Chairman of the Committee on Research, and is published as a supplement to Vol. XXXI, No. 6, JOURNAL OF ENGINEERING EDUCATION.

S. P. E. E. SUMMER SCHOOLS

Impressions as to Values Received.

No. 1. Very good.
No. 2. Very much worth while, inspiring.
No. 4. Very useful and got a great deal out of it.
No. 5. Marked value.
No. 7. The institution has defrayed all expenses. Good contacts for the younger instructors. However, it seems that the summer schools are attended too largely by professorial talent and not largely enough by instructors.
No. 8. Very great.
No. 10. Excellent.
No. 13. Three men attending last summer found the courses valuable.
No. 15. They are very considerable and well worth the effort.
No. 16. Decidedly advantageous. Stimulating interest and inspiration.
No. 17. As far as we have observed, this work has been very helpful.
No. 19. Each of them has expressed himself as believing that his time was spent to very great advantage in the summer school.
No. 27. Sufficiently great to warrant especial emphasis upon its continuation and our attendance.
No. 32. Favorable in every instance. Would encourage attendance by all eligible.
No. 33. They are very much worth while.
No. 36. It is my impression that teachers who have attended the special summer school work have been helped and given a new out-look in their teaching profession. Contacts made in changing work are not only helpful but very desirable. It is my belief that such summer schools courses should be greatly strengthened and improved, though this is not a criticism of former summer schools.
No. 38. Most valuable.
No. 39. Great value.
No. 44. By the contacts with other instructors and the interchange of ideas on teaching, our faculty members have

been more than repaid for the time and expense incurred.

No. 46. Benefit derived from lectures relatively small. More desirable to have expert teachers conduct model classes. Personal contacts with men from other institutions regarded as the most valuable feature.

No. 49. One member of our faculty seems to have been stimulated by the experience.

No. 51. They seemed to get a good deal of inspiration from the experience; new points of view; and profited by meeting others working in their field.

No. 52. Never attended.

No. 54. Very well worth while.

No. 57. Was valuable for the instructor who attended last summer (1929).

No. 61. The schools are felt to be of very considerable value, both from a technical and inspirational standpoint.

No. 62. We believe that the teacher is greatly benefited and that this is reflected in his daily class work.

No. 63. Those who have attended have most favorable reports and the impression is that they are well founded.

No. 67. Very good.

No. 68. Benefit has been general rather than specific.

No. 69. Of very great value.

No. 70. Favorable.

No. 72. We have had one man attend an S. P. E. E. Summer School. He returned amply repaid for the expense and trouble of the trip.

No. 75. The attendance upon the meetings has been the main source of keeping in touch with progressive educational policies. The reports of the Board of Investigation and Coördination contains a comprehensive group of facts which are invaluable to Engineering Education.

No. 79. Very beneficial.

No. 83. Perhaps of some value to the man who goes. Doubtful whether others have benefited.

No. 84. Many points of help; contacts with others gave ideas to our attendant, although the subjects discussed were not in his line. He believes the schools are very helpful.

No. 85. Excellent. We endorse the plan heartily.

No. 87. Believe much may be gained by attending the summer schools.

No. 89. Very much worth while.

No. 91. Excellent results. More men should go.

No. 93. The time is well spent. Teaching has been improved and those who have attended given greater confidence in our own methods.

No. 95. Very much worth while.

No. 96. That they are not permanent.

No. 97. I am gratified by the enlivened interest in methods, in particular. Our instructors are urged to attend, if practicable.

No. 99. Willing, but in their regular fields of work instructors have outside employment during the summer and feel that they cannot afford to miss this opportunity to add to their yearly income.

No. 100. Many new points were obtained by both teacher and student who were in attendance from Ohio State University. At Purdue the work was considered valuable, especially that done in committees.

No. 101. Very gratifying.

No. 105. Very favorable.

No. 106. Of very considerable value. General in effect rather than specific.

No. 107. Values received are well worth while.

No. 111. Have no information.

No. 112. Reports of those of our faculty who have attended the schools have been favorable and in most cases enthusiastic. I regard the schools as of great value.

No. 113. Personal contacts with men conducting summer sessions and discussions with men from other institutions.

No. 114. Very beneficial.

No. 115. Two members of the engineering staff have attended the summer schools at their own expense. The reports are especially favorable and other members of the staff have been urged to attend the summer schools.

No. 118. The institution has been represented every year at individual expense. The above together with fact that we shall be represented at both sessions for 1930 indicates our favorable opinion.

No. 119. Worth much more than the expenses involved.

No. 123. Excellent. Representatives at two schools have rated them as very valuable.

No. 124. Have been very valuable in offering suggestions of improved methods both by means of lectures and by contact with those in attendance.

No. 126. Of inestimable value.

No. 127. Those members of our engineering faculty who have attended the S. P. E. E. Summer Schools have been very much pleased with the benefits received.

No. 130. We are sending a man to Pittsburgh and believe results will justify the expenditure.

No. 132. Good, members attending have been pleased.

No. 134. Favorable.

No. 136. They are very much worth while.

No. 137. The contact with others and the work done has greatly benefited those who have attended.

No. 138. Very valuable.

No. 141. Very worth-while. Will have representative present at all future schools.

No. 143. So far as I can understand, results have been very good indeed. Several of our men attended last year.

No. 145. None have attended.

45 per cent of the institutions reporting defray the expenses in whole or in part of their representatives at the S. P. E. E. Summer School.

General Administration

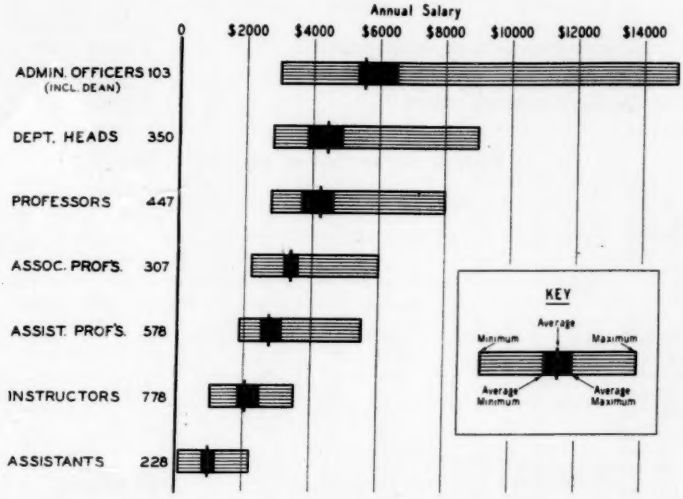
Salaries of Engineering Teachers *

	Number of Insts.	Number of Cases	Maximum Salaries		Average Salary	Minimum Salaries	
			Highest	Average		Average	Lowest
Administrative Officers (Incl. Dean)	58	103	15,000	6,540	5,540	5,330	3,000
Department Heads	51	350	9,000	4,880	4,430	3,845	2,800
Professors	52	447	8,000	4,630	4,230	3,660	2,750
Associate Professors	54	307	6,000	3,575	3,370	3,165	2,200
Assistant Professors	66	578	5,500	3,115	2,745	2,515	1,850
Instructors	65	778	3,500	2,490	2,050	1,845	1,000
Assistants	44	228	2,200	1,190	965	800	75

* *Ibid.*, page 309.

Salaries of Engineering Teachers

Data from 66 Institutions—Dec. 31, 1929



Teaching Load *

(Data from 89 Institutions)

	Clock Hours per Week		
	Max.	Aver.	Min.
Department Heads	22	13.2	6
Professors	28	15.4	10
Associate Professors	30	16.3	10
Assistant Professors	32	17.1	9
Instructors	30	17.6	6

Personnel Systems

Methods in Placement of Seniors

Number of Institutions Reporting	89
Personnel or Placement Officer	31
Dean or Similar Administrative Officer	27
Department Heads	79
Institutions Using One Method Only	47
" " Two Methods	36
" " All Three Methods	6

* *Ibid.*, page 313.

Opportunities for College Graduates

Data from 47 Institutions

	Total	Average per Institution
Number of Senior Engineering Students	4282	91
Number of Industrial Visits	1618	35
Other Contacts	5757	123
Number of Positions Offered	7697	164

Distribution of Initial Salaries *

Engineering Graduates—1929

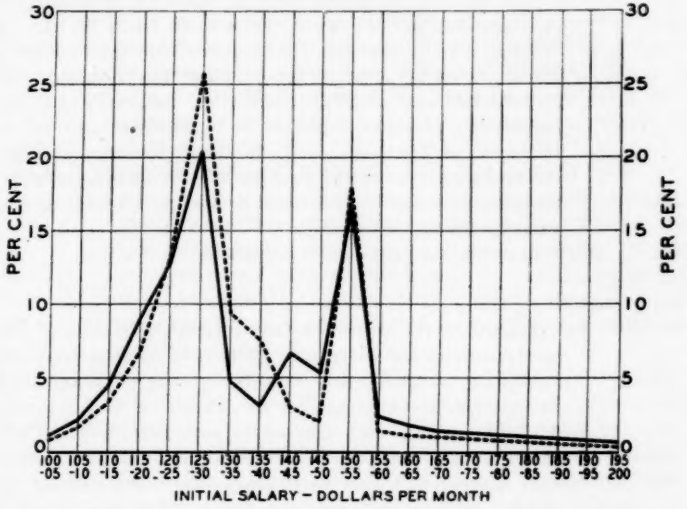
Monthly Salary	Area A		Area B	
	Number	Percent	Number	Percent
Below $120	395	17.9	82	13.6
120–124	282	12.8	80	13.3
125–129	451	20.4	155	25.7
130–134	105	4.8	56	9.3
135–139	68	3.1	46	7.6
140–144	148	6.7	18	3.0
145–149	118	5.3	12	2.0
150–154	368	16.7	108	17.9
155–159	53	2.4	9	1.4
160–174	98	4.4	19	3.2
175–199	91	4.1	14	2.3
Above $200	30	1.4	4	0.7
Total	2207	100.0	603	100.0
Number of Institutions	18		17	

Area A—East of the Mississippi and North of the Ohio and Potomac Rivers.
Area B—West of the Mississippi and South of the Ohio and Potomac Rivers.

* *Ibid.*, page 234.

INITIAL SALARY OF ENGINEERING GRADUATES IN 1929

——— Distribution of 2,207 cases in area A
- - - - - - Distribution of 603 cases in area B



Brief statements of types of records kept for placement purposes.*

No. 1. Card Index System kept by Executive Secretary, Alumni Association.

No. 2. Following data for each position. 1. Name of Company. 2. Address of Company. 3. Man to interview. 4. Type of position. 5. Salary. 6. Qualifications. 7. Remarks. 8. People sent and their findings.

Record of Applicant. Name, address, telephone, class, course, type of work desired, minimum salary, experience, remarks, positions sent to and findings.

No. 4. The usual statistical information is collected from every member of the senior class, including an Employment Information Sheet from which seven or more blueprints are made. These blueprints are for distribution to the personnel representatives who visit Carnegie, or to send out through the mail to companies who wish to correspond with the graduates. The information sheet includes such items as name of student, course taken, college and home address, date of birth, na-

* *Ibid.*, page 235.

tionality, physical defects, if any; how summers were spent, any experience with firms, student activities, other colleges attended, etc.

The faculty members rate the student according to the specific kind of work for which he is fitted. A member of the Bureau, by means of an Interviewer's Blank, rates the student according to his character, his appearance and address, whether or not he is convincing in conversation, whether he is likely to succeed in business, and whether reports from previous employers and members of the faculty are favorable, unfavorable, or uncertain. Scholarship and psychological test ratings are also available.

No. 5. Each department keeps such records as it desires.

No. 7. ——

No. 8. ——

No. 10. In addition to the usual scholastic records, Heads of Departments and Registration Officers of courses kept regular files (usually card records) giving personal characteristics, notes of special qualifications or handicaps and connection with undergraduate activities. These records are available to the Alumni Placement office.

No. 11. None. President's secretary takes this work during the year. Scores and perhaps more than one hundred great corporations and others send personnel officers here between February and June each year looking for members of the graduating classes.

No. 13. ——

No. 15. Scholastic record detailed and averaged. General acquaintance with extra-curricula activities. Department members' reaction as to personality.

No. 16. None.

No. 17. Personnel records and collegiate grades are available in certain departments for placement purposes.

No. 18. A student qualification record card is filed in the personnel office giving student's name, age, nationality, residence, languages read easily and spoken easily, student activities participated in, class record, opinion of the interviewer, aptitude and interest, practical experience had, and, altogether, the information usually sought by personnel managers in industry.

No. 19. No special records kept. File of letters of prospective positions open in the year for recent graduates and also for those out longer.

No. 21. ——

No. 23. ——

No. 24. None kept.

No. 25. ——

No. 26. In the Dean's office is kept a card file of all Engineering School graduates, giving name, address, class and occupation—kept up to date by a yearly card sent out to each man and by the graduate bulletins. There is also a special card kept for each man who indicates that he wishes to be notified of positions for which he might qualify.

No. 27. Students' academic record kept on file together with data covering any practical experience he may have accumulated, and instructor's impression of his attitude, interest, character, and extra-curricular activities. Also a follow-up of progress or change in work or advancement in rank and salary. This latter record is voluntary on the part of graduates but a request to which they have eagerly responded.

No. 31. Records of shop work as coöperative students, together with class grades, are available for placement of seniors.

No. 32. Our blank is much like the typical blank used by companies. On one side is space for scholarship records, character ratings, and the estimates of various professors. The other side is for the student himself to fill out and includes identification material, space for picture and place to describe the job preferred. A copy of this blank is attached.

No. 33. We keep very complete records of both scholastic achievement and coöperative work. A detailed account of the type of job, kind of work done, report of the employer, and similar data, cumulative over the five-year period, becomes available at graduation for purposes of vocational guidance and placement. Thus the personal qualifications, aptitudes and abilities of each student are quite definitely known which makes the problem of placement much less difficult than would otherwise be the case.

No. 34. File records.

No. 36. The Engineering Department itself keeps no records for placement purposes for several reasons. First, all of our graduates are employed immediately after all commencement activities are over. Those who are temporarily out of a position write in to the Dean of Engineering who informs them of any position that may be open. He himself gets this information from

the companies who are constantly requiring new help. Second, a placement bureau is being started under the administration of the College of Education. This has not functioned long enough for us to see whether or not it is entirely successful.

No. 38. Optional with department heads. He arranges the conferences between employers and students.

No. 39. Our regular scholastic record cards with additional cards in office of Dean giving professional record of graduate. The Personnel Director has record blank of his own.

No. 42. ——

No. 44. ——

No. 46. No special type of records. Prospective employers hold personal conferences with Dean or with department heads.

No. 48. No special records kept for placement purposes. Regular records consulted when necessary.

No. 49. Scholastic records on file in office of Registrar (copies in office of Dean), and individual record cards showing details of career following graduation, the latter maintained by Alumni Representative on the basis of periodical questionnaires sent to graduates.

No. 50. ——

No. 51. Full records of mental and scholastic aptitude rating. Scholarship, extra-curricular activities, work for self-support. General personnel rating by instructors.

No. 52. As this is a coöperative college, placement is an undergraduate, as well as a graduate, problem. Careful records are kept throughout the student's course of all data bearing on placement. Pre-college industrial experience is recorded at the outset. Entries are made throughout the college course on the basis of reports received each five weeks from the student's employer and from the student himself. In addition, we keep a record of the interviews of the student with the personnel officers. His vocational interests are checked frequently and recorded. After graduation an annual check is made of the positions occupied by alumni.

No. 54. Positions are offered to graduates on the basis of personal knowledge of the student and his special aptitude. We do not make any organized attempt to place men after their first position. It is not necessary.

No. 57. Records of all seniors (some begin in Junior year) kept at placement bureau, opinions of faculty and fellow

students, academic and extra-curriculum accomplishments, personal characteristics and preferences are recorded.

No. 58. ——

No. 61. Our numbers are so small this is not necessary.

No. 62. Our record of coöperative work done by the students shows the name of the employer, the type of work done by the student, the length of service, the amount of pay received, and the employer's estimate of the student's ability.

No. 63. A placement officer of Tufts College has been recently appointed. As yet he has had little to do for engineers. The records of the Dean's office are available and through his secretary had been constantly useful. The chief responsibility rests on the department heads who handle the matter on the basis of personal acquaintance.

No. 67. Scholastic records and personal qualification records made by faculty members.

No. 68. Rating of each student by three instructors on personal qualities: (1) habits, (2) popularity, (3) address, (4) mental calibre, (5) self-reliance, (6) industry, (7) speed, (8) accuracy, (9) reliability, (10) initiative, (11) forcefulness, (12) judgment. Record also of physical defects and of peculiarities.

No. 69. None other than standard student records.

No. 70. A one-page (or both sides of an 8×5 card) personnel record is kept—photo, scholarship, personality, etc. Each professional department keeps its own records, and almost entirely handles the placement work for its seniors.

No. 71. With small classes no "system" is needed for record.

No. 72. ——

No. 74. None really necessary. We have thorough personal acquaintance with every graduate.

No. 75. ——

No. 77. None.

No. 79. No detailed records kept. An alumni directory is published every few years, but this gives only the present positions of those whose address is known.

No. 81. ——

No. 82. Registration form on which the student lists information regarding age, degree, experience, major and professional work, and faculty references. Reference forms on which the major professor, supervisor of practice

teaching, and general references give estimates of the student's ability. Note: The records refer to the placement of teachers as that is the only form developed as yet.

No. 83. Personnel cards (attached).

No. 84. Mining—personal records in Dean's office. Mechanical—personal records, personality records and grades, scholastic records, etc. C. E.—personal and scholastic records. In the Alumni Bureau of Occupations, quite a complete record of those who are there listed, letters of recommendation, etc., and a perforated card system for ready selection of those listed in any group or occupation.

No. 85. We have a fairly fully developed personnel and placement bureau.

No. 87. List of graduates, where and by whom employed and a list of employers interested in our graduates.

No. 89. High school record. University scholastic record. University extra-curricular activities record. Record of employment during vacation.

No. 91. A simple record sheet is made out by each senior at the beginning of the year. This record sheet is also kept as a permanent record after graduation, being brought up to date from time to time.

No. 93. Scholastic records. Outside activities. Personal characteristics. Opinions of teachers regarding student.

No. 94. Each department head keeps in contact with outside sources, and with the graduates. Arrangements are made with a number of large companies for interviews between their representatives and seniors.

No. 95. Scholastic records. Evaluation by faculty members.

No. 96. Photograph; degrees; major interests; college and home addresses; personal data; high school information; college information; practical experience.

No. 97. Personal and scholastic. Experience, general and technical. College activities, clubs, etc. Activities as a citizen. Preferred employment. Current salary (subsequent to graduation).

No. 98. High school and college records. Photograph. College activities. Vacation activities in part. Intelligence test scores.

No. 99. Use made of scholastic record, in which is kept record of class and extra-curricula activities of student. On account of having small classes and heads of departments meeting men usually for three years in classes,

detail records of many characteristics of men are not made.

No. 100. In one department Qualifications and Characteristics records of upper-classmen are obtained from their instructors and student associates. Some departments obtain a complete report from the industry where the student has been employed during vacation periods. In several cases the departmental faculty consider the qualifications of individual students for certain positions which have been offered. All departments keep records of demands.

No. 101. A composite record of each student's personality ratings, scholastic record, health record, intelligence test, practical experience, student activities, vocational preference and other general information is kept for every engineering student. Detailed material is kept in a record folder and the composite is made on a 5×8 personnel card for use of employers and teachers. Copies of the personnel records are furnished to the heads of the various schools and departments regularly.

No. 102. None kept.

No. 104. Personnel information about Engineering students available in Dean's office.

No. 105. All correspondence and calls relating to employment are kept on file and are available for student reference. An annual letter is sent out to alumni and former students and a card catalog file is kept of addresses, positions held, etc.

No. 106. Scholastic record. College activities. Outside experience. Earnings during college course. General opinion of senior instructors as to personal characteristics. General nature of work preferred (in some departments).

No. 107. Regular file.

No. 111. Engineering Personnel Leaflets. Interview and Placement Record. Note: Beginning next year, we will use a rating sheet for each senior. These will be filled out by heads of departments and members of the teaching staff.

No. 112. (Character and Personality Record attached.) Form used by electrical engineering department. Most departments employ similar card records.

No. 113. No specific records kept.

No. 115. Ratings—placement tests of freshman week. Scholar-

ship record. Personality ratings. Health record. Record of membership in student organizations and offices held.

No. 117. Records of students in each department kept by head of department.

No. 118. Aside from scholarship records no records are made. Members of staff know every senior intimately. Each member of staff is requested to report on seniors. Estimate of each senior determined by staff conference after individual reports have been filed. Estimates are filed for future reference.

No. 119. No permanent placement records are kept in the Division of Engineering, however, the Secretary of the Former Students' Association is entrusted with keeping a thoroughgoing set of records of the men and positions which are open from time to time.

No. 120. The records kept for placement purposes are just in the process of organization and development. They will be very similar to the American Council personnel sheet with the addition of a sheet for the alumni records which will give specific information regarding employment and address.

No. 121. For assistance of industrial representatives and for our own use, we have a personnel record system, copy of which is enclosed.

No. 123. Senior classes in each department number from 12–20. Small enough so that the need for special records for the purpose has not yet been felt. The department head has two years of rather close contact with each individual.

No. 124. These are kept by the different departments and have not been standardized. In the larger courses, instructors are asked to rate seniors on industry, initiative, personality, and similar characteristics and this is kept on file.

No. 126. No special records for this purpose.

No. 127. Recent photographs. Record of grades made during entire college course. Record of practical engineering experience. Record of college activities. Record of personal history. Rating by three professors on scholarship, industry, initiative, accuracy, self-reliance, common sense, personality, appearance, and resourcefulness.

No. 128. ——

No. 129. Our placement bureau, in charge of one of our professors,

maintains a clearing house of information regarding positions and aids the graduates, whether recent or of former years, to find satisfactory positions. Throughout the year the bureau keeps in touch with the industries so that each graduate may have an opportunity at the end of his course, to consider several openings. A card record is kept showing positions available, students recommended, names of students interested in securing employment, and dates on which they will be available.

No. 130. Interviews and correspondence with industrial departments and research divisions.

No. 131. No formal records kept. The school keeps in touch with alumni and has an employment record of each.

No. 132. No definite system but results have been effective

No. 133. The number of graduates is so small that all of the four professors have complete first-hand knowledge of every man. For our files we keep a biographical sketch of each student, prepared by the students themselves, along with grades and a card on which the composite opinion of all professors in the college who have taught the men is given with regard to such qualities as initiative, personality, leadership, etc.

No. 134. Seniors are graded by several of their professors on personal qualities—a composite rating of these qualities is then put on the record cards of the students.

No. 135. Contacts with industry, employment managers visiting institutions.

No. 136. Nothing permanent has been done in this matter as our first graduates were turned out last June.

No. 137. A full record of each student is kept on file and all information for placement purposes in the office of the registrar. The heads of departments consult these files.

No. 138. In connection with the coöperative work, the student and employer submit periodical reports regarding the outside work. Some students are retained by their employer after graduation.

No. 139. The College of Engineering and Commerce is on a cooperative basis, and we have a coördinator for each department of Engineering. The records give a detailed statement of the practical experience which a student has procured; also the employer's ratings on the various jobs held. It indicates, too, his class standing, his activities in student affairs, his physical record, and a brief statement of his history prior to his entrance to college.

No. 140. Each graduate is listed and a record kept of their employment. As the number is still very small this office is acquainted with the individual and knows his ability.

No. 141. Personnel blanks and scholarship records.

No. 142. ——

No. 143. We have never found any necessity for keeping records for placement purposes. Our students are all placed, most of them, before they graduate and the number of men out of work is extremely small. A case has not come to my attention for the past two years.

No. 145. No records kept.

How is information of employment opportunities conveyed to seniors and undergraduates? *

No. 1. By personal conferences and notices on bulletin boards.

No. 2. Information of opportunities is sent to suitable applicants on file by mail or telephone. Also by visiting representatives from large industries and corporations.

No. 4. The Bureau of Recommendations invites companies, interested in the graduates from the engineering and industries courses, to send representatives to the University. Another type of contact is made with companies interested in receiving applications by mail. The Bureau itself merely forms the contact between the graduate and the employer, it does not do any particular vocational guidance work with the senior. However, due to the fact that it invites companies and furnishes information to the students, it does control the so-called exploitations of the young graduate by the mere fact that the less reliable concerns are not included on its accredited firm list. The usual information as to salaries, working conditions, promotion policies, etc., is collected by the Bureau and given to the graduates.

No. 5. By department heads, by direct investigation, and through posted notices.

No. 7. By visits from representatives of the leading industries, and individual cases by faculty advisers and department heads, and faculty committee on student relations.

No. 8. By direct contact between seniors and faculty in the several departments.

No. 10. Notices on general and department bulletin boards. Notices to seniors in class. Facilities for contacts of students with visiting industrial representatives.

* *Ibid.*, page 250.

No. 11. By personnel men of corporations. By letters filed with President's secretary. By heads of the various departments.

No. 13. Through department heads interviews are arranged with representatives of employers.

No. 15. Letters and notices are posted on special bulletin boards. General notices read to the section as a whole. Individual personal conferences with certain promising candidates.

No. 16. We have no difficulty in placing our engineering graduates. The demand exceeds the supply. Representatives of leading industries and organizations meet the students during the second semester of senior year and present their opportunities by meeting groups and in personal interviews.

No. 17. Notices are posted on bulletin boards. Applications are handed in person to interested students. When personal representatives come on the ground they are shown every possible courtesy to enable them to interview personally all students interested, and inquire into the respective records of these students.

No. 18. Notices are posted on bulletin boards. Seniors are interviewed and opportunities in the professions made known.

No. 19. Notices of positions which are open are often posted on the Dean's bulletin board. Letters from employers are referred to appropriate department heads.

No. 21. ——

No. 23. ——

No. 24. Personal interview.

No. 25. ——

No. 26. Bulletin board notices in corridors. Notices read in class by the instructors.

No. 27. Conferences. Bulletin board. Posters.

No. 31. Department of Industrial Relations makes personal contact with seniors, or recommends names to employers looking for seniors. Undergraduate employment is all handed by this department under the coöperative plan.

No. 32. Like all other schools, we arrange for interviews between the recruiting officers of companies and the seniors. We also have employment bureau which attempts to register the seniors and to acquaint them with opportunities which they have gathered through means of circular letters. Finally, through the coöperative plan we are able to learn of many employment wants

and in the latter case transmit the information to students through notices or announcements by one of the professors in class.

No. 33. Approximately 50 per cent of the graduating seniors annually remain with their coöperative firms. A large number of representatives of industry visit the school annually and have personal interviews with members of the graduating class. Every senior is accorded the assistance of his coördinator in finding suitable after-graduation employment; but the responsibility for getting the job rests squarely upon the shoulders of the student. It is not uncommon for every member of the senior class of over 200 men to have secured an after-graduation job before Commencement.

No. 34. By company representatives mainly. Also various companies will write.

No. 36. Approximately from eight to ten companies write in each year concerning our engineering seniors. Six to eight of these companies send representatives who interview our students and pick the best men. In the past we have had little or no difficulty in placing all of our graduates.

No. 38. Through the department concerned. Usually directly from the department head to the individual student.

No. 39. By Dean and personnel director, by personal announcement, by letter from personnel director, by announcement in our daily newspaper.

No. 42. Bulletin boards and oral announcement by professors. The companies that employ large numbers of engineering graduates send their representatives to the campus each spring to interview the seniors and make offers of positions.

No. 44. Opportunities for employment are offered seniors and undergraduates by representatives of the various industries who visit our college at times previously arranged for. These representatives consult our college records and the various department heads, and then hold personal interviews with the students.

No. 46. By announcement in classes.

No. 48. By personal interview.

No. 49. Through bulletin board notices and personal interviews with Deans and heads of departments. Part time employment for undergraduates is handled through Board of Recommendations centered in office of Alumni Representative.

No. 50. Bulletin boards and interviews.

No. 51. The Personnel Bureau gets out regular bulletins stating what firms are seeking men and describing the positions open. From the records on file and in coöperation with the departments of study, the Bureau selects a man or a group of men who appear to be eligible for a particular job, or for any of several jobs, and notifies the student or students. If any of the students is interested, the company or firm is informed of the fact and very commonly arrangements are made for representatives of the firm personally to interview the candidates. The firm may secure more intimate information through consultation with the department chairman. The Bureau endeavors to give the students the fullest possible information regarding the firms offering positions. There is a Yale Graduate Placement Bureau in New York City, which coöperates with the Bureau in New Haven. The New York Bureau concerns itself not only with finding positions for graduates temporarily out of a job, but also endeavors to locate desirable openings for men who may wish to change their location or type of work.

No. 52. Generally through the personnel officers of the Extramural School.

No. 54. Directly by Dean or through medium of representatives of prospective employers who come to Hanover for that purpose.

No. 57. By telephone or note. Opportunities for interviews are arranged by director of bureau. Ninety firms have representatives at the college this year; sixty-five last year. Last year 85 out of 116 registered with the Bureau were placed before graduation. The Bureau also finds term and summer employment for undergraduates; post office Christmas work, etc.

No. 58. ——

No. 61. By posting of literature on bulletin boards. By having representatives of employers interview students.

No. 62. For graduate employment, opportunities are presented to all of the seniors; those interested may apply. Undergraduates are assigned to coöperative work by the coordinator.

No. 63. Largely through the Secretary to the Dean and by department heads.

No. 67. By personal conferences and through the visits of industrial representatives.

No. 68. Bulletin board and conference with heads of departments.

No. 69. Through verbal and bulletin board announcements, circular letters, personal conferences.

No. 70. Information published on regular bulletin boards and also in "Official Bulletin" in the *Michigan Daily*. Some departments keep special files open at all times to inspection by students. Preliminary contacts are made in some cases at the end of the first semester, by sending out to prospective employees records, photos, etc., of men who will graduate.

No. 71. Through personal interviews.

No. 72. ——

No. 74. Personal conversations, and also bulletin board notices, announcements at engineering society meetings, and correspondence.

No. 75. ——

No. 77. ——

No. 79. From companies which send a personnel agent to the school. From direct application from companies for men. An employment bureau is being formed with a stenographer in charge of records and addresses so quicker connections can be made when a call for a man comes in.

No. 81. ——

No. 82. The school authorities write to the Appointment Bureau listing vacancies which they wish to fill. The Appointment Secretary then recommends those graduates fitted to handle the type of work described. The school officials may choose among several candidates qualified.

No. 83. By interviews, letters and personal visits.

No. 84. By personal communication, either oral or written, by statements to senior classes (College of Mechanics especially), by posting notices on bulletin boards in the different buildings, and by listing opportunities with the Alumni Bureau of Occupations. The student branch members of the founder societies are urged to list their names with Engineering Employment Service in San Francisco.

No. 85. By bulletins, usually, but we depend mostly upon representatives of industry who visit us.

No. 87. By personal contact between instructors and students. By bulletin boards. Notices in the daily bulletin.

No. 89. Lectures by representatives of corporations. Talks by faculty members. Talks by outside engineers.

No. 91. By personal interviews and talks to the senior class.

No. 93. Bulletin boards. Announcements in classes. Recruiting visits of company representatives.

No. 94. By department heads.

No. 95. Posted notices; talks by employers' representatives; conferences.

No. 96. Bulletins and through department heads. Also visiting representatives of industry.

No. 97. Bulletin board, class notices, direct contact. Rather informal, as a whole.

No. 98. Personal conference with professors.

No. 99. Bulletin boards and visits of company representatives.

No. 100. By department heads—either individually or by posting information on bulletin boards.

No. 101. Information of employment opportunities is conveyed to the seniors: 1. By representatives of industrial concerns visiting the campus and interviewing the seniors. 2. By the Personnel office of the Schools of Engineering through collected information over about eight hundred concerns, and interviews with seniors and undergraduates concerning employment. 3. Through teachers and administrative officers. 4. Through surveys of employment and return by the company of information and request for recommendations.

No. 102. Directly or indirectly through the department heads.

No. 104. Dean or department heads.

No. 105. Through department heads and bulletin boards.

No. 106. By talks from faculty and largely by literature and explanations from representatives of industries. Also by bulletin boards.

No. 107. Bulletin board and personal contact.

No. 111. Personal interviews with heads of departments and personnel officers. Illustrated with lectures by representatives of industrial concerns. Booklet, pamphlets, catalogs, etc., available in the Engineering Personnel office. Personal interviews with industrial representatives who visit the campus. Senior inspection trips.

No. 112. Personal interviews, seminary talks, bulletin boards.

No. 113. Personal consultations.

No. 114. Through bulletins. Public announcements and visits by representatives of industry.

No. 115. By a centralized-decentralized personnel and placement bureau. By department heads. By bulletin board announcements.

No. 117. Nearly all our seniors are engaged by employers or their representatives who visit the college and interview them. If any are not placed before graduation, they are usually placed by head of department, who gives them information at their home addresses, or wherever they may be. Students who wish to make changes write to head of department.

No. 118. Through Dean's office or department heads.

No. 119. Through announcements during lecture periods and posting of notices on the bulletin boards.

No. 120. Graduates are informed concerning employment opportunities by the heads of the respective departments. When representatives from large companies employing men of several departments visit the campus, appointments are made and scheduled by the Dean's office.

No. 121. A calendar of coming interviews is posted. Heads of departments announce and give information about companies coming to interview or those writing for applicants.

No. 123. Usually by announcements made in class periods. It is customary to use some time in making announcements and giving out general information.

No. 124. By announcement in classes, by publication in Daily Bulletin, by posting on certain bulletin boards, and in some cases by calling in selected individuals for conference.

No. 126. Bulletin boards and notices read in senior classes by department heads. Also items in college paper.

No. 127. By conference with company representatives and through correspondence under the supervision of the personnel officer.

No. 128. ——

No. 129. ——

No. 130. Personal interviews by department heads.

No. 131. Handled through personal conferences by the Professor of Mining and Metallurgy.

No. 132. Chiefly through department heads and by bulletin board notices.

No. 133. The professors, chiefly the department head, looks out for employment opportunities and passes the information on directly to such men as he may think qualified.

No. 134. Through visiting representatives of industries. Through heads of departments. Through College Placement Office.

No. 135. By the heads of departments and representatives of industry.

No. 136. Through department heads and industrial representatives visiting the campus.

No. 137. By personal interview by the heads of departments with students and also by announcement to the classes.

No. 138. When in school by a personal interview, otherwise by correspondence.

No. 139. All of our students are on coöperative jobs.

No. 140. Any general inquiry is posted. All civil service examination notices are posted. All may see these notices. Most of the inquiries come in the form of a letter or a telephone call and specific information is given in regard to the type of man desired. In such cases only men who will meet the requirements are informed of the vacancy.

No. 141. By the Dean and heads of departments.

No. 142. ——

No. 143. Occasionally information concerning very exceptional opportunities come to hand and these are usually conveyed to department heads who, after a conference with the coördinator, approach the young man selected.

No. 145. Through the Dean of men or department heads.